

STUDENT BOOK

SUCCESS **OAS**
with

Math 7

Ensuring Student Success *with* Oklahoma Academic Standards

Written by Oklahoma Teachers for Oklahoma Teachers

Nicole Hall



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ISBN: 978-0-9988378-7-1

SUCCESS *with* OAS



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7.N.1.1 Know that every natural number can be written as the ratio of two integers or as a terminating or repeating decimal.

Real-World Connections

In the real-world why would you need to know a ratio? A ratio can help you find the best unit price. For example, is the large 44-ounce container of ketchup a better buy than the sale of two 20-ounce containers of ketchup? Since you want to save money when you can, this is one example of how knowing a ratio can be a useful tool in your daily life.

Vocabulary

natural or counting number	1, 2, 3, 4, 5... no zero
ratio	a relationship between quantities, for every a units of one quantity there are b units for the other; a ratio is often denoted by $a:b$ and read “ a to b ”
integers	the set of numbers that contains the whole numbers and their additive inverse (opposites); no fractions or decimals
whole number	zero and counting numbers; the numbers -3, -2, -1, 0, 1, 2, 3,...
rational number	a number expressed as a fraction p/q where p and q are integers, where $q \neq 0$
equivalent	equal
terminating decimal	a decimal that ends
repeating decimal	also called a recurring decimal; a number whose decimal becomes the same sequence of digits and repeats indefinitely and the repeating digit is not zero
non-repeating decimal	a decimal that neither terminates nor repeats
non-terminating decimal	a decimal that does not end in an infinite sequence of zeros; also known as infinite decimal.
bar notation	a horizontal bar over decimals to indicate they repeat

The repeating portion of a decimal expansion is denoted with a vinculum,
for example, $\frac{2}{3} = .666666 = 0.\overline{66}$

Given natural numbers and ratios identify terminating and repeating decimals.

Natural Number or Ratio	Decimal	Terminating or Repeating
1. 5	$\frac{5}{1} =$	
2. $\frac{1}{3}$	$\frac{1}{3} =$	
3. $\frac{1}{2}$	$\frac{1}{2} =$	
4. $\frac{3}{4}$	$\frac{3}{4} =$	
5. $\frac{5}{6}$	$\frac{5}{6} =$	
6. $\frac{7}{10}$	$\frac{7}{10} =$	
7. $\frac{3}{5}$	$\frac{3}{5} =$	
8. $\frac{5}{12}$	$\frac{5}{12} =$	
9. $\frac{2}{6}$	$\frac{2}{6} =$	
10. $\frac{7}{8}$	$\frac{7}{8} =$	

7.N.1.1 Know that every natural number can be written as the ratio of two integers or as a terminating or repeating decimal.

Convert the following ratios to their equivalent decimal and identify as terminating or repeating.

Example: $\frac{2}{12} = 2 \div 12 = 0.1\overline{6}$ repeating decimal

1. $\frac{6}{12} =$	2. $\frac{2}{3} =$
3. $\frac{1}{4} =$	4. $\frac{7}{8} =$
5. $\frac{2}{5} =$	6. $\frac{1}{6} =$
7. $\frac{11}{12} =$	8. $\frac{5}{8} =$
9. $\frac{7}{12} =$	10. $\frac{4}{5} =$

Independent Practice (7.N.1.1)

Name _____

Convert the following ratios to their equivalent decimal and identify as terminating or repeating.

Example: $\frac{7}{11} = 7 \div 11 = 0.636363\overline{63}$ repeating

11. $\frac{3}{8} =$	12. $\frac{8}{10} =$
13. $\frac{1}{12} =$	14. $8 =$
15. $\frac{2}{4} =$	16. $\frac{1}{10} =$
17. $\frac{10}{12} =$	18. $\frac{9}{10} =$
19. $\frac{1}{5} =$	20. $\frac{1}{8} =$

A ratio is a comparison of two quantities by division. It can be written three ways.

$$\frac{60 \text{ miles}}{1 \text{ hour}}, 60 \text{ miles: } 1 \text{ hour, or } 60 \text{ miles to } 1 \text{ hour}$$

For questions 1-4, complete the ratios.

A school bus carrying passengers on a field trip to a local art exhibit at the Great Plains Museum contains 12 boys, 10 girls, 3 parents, and 2 teachers. Write the given ratio in all three forms.

1. Ratio of boys to girls.

3. Ratio of teachers to students.

2. Ratio of girls to boys.

4. Ratio of students to adults

Order the numbers from greatest to least

5. 0.05, 0.503,
0.053, 0.53

6. $\frac{2}{5}, \frac{3}{4}, \frac{4}{5}, \frac{2}{3}$

7. 28%, 84%, 4%, 48%

Use <, >, or = to compare the following numbers.

8. $\frac{7}{8}$ 1.736

9. 0.064 0.640

10. 9% $\frac{9}{10}$

7.N.1.2 Compare and order rational numbers expressed in various forms using $<$, $>$, and $=$.

Real-World Connections

Today you will learn to compare and order rational numbers expressed as a fractions and decimals. If you wanted to buy 24 soft drinks to take to a friend's birthday party, how would you know if the best buy was 2 12-packs or a case of 24? You would compare the prices by using a fraction or decimal.

Vocabulary

compare	tell how two or more things are alike
order	an arrangement of a set group of objects
symbols	symbols and signs are commonly used to represent values, equality, operations, grouping and mathematical terms
greater than	more than, symbol $>$
less than	the relationship of one number being smaller than another number, symbol $<$
equal to ($=$)	a symbol indicating two numbers are the same ($7 = 7$)

Compare the fractions and decimals. Write $<$, $>$ or $=$.

1. $\frac{2}{5}$ $\frac{4}{5}$

7. 4.927 4.925

2. $-\frac{11}{12}$ $-\frac{10}{12}$

8. 2.08 2.80

3. $\frac{7}{8}$ $\frac{3}{5}$

9. -8.46 8.466

4. $\frac{3}{4}$ $\frac{9}{12}$

10. 0.05 -0.5

5. $\frac{1}{3}$ $-\frac{2}{3}$

6. 0.525 0.524

Guided Practice (7.N.1.2)

Name _____

Order the numbers from least to greatest.

11. $-2, -3, -1, -5$

12. $\frac{2}{8}, \frac{2}{6}, \frac{2}{5}, \frac{2}{12}$

13. $0, -\frac{1}{2}, -0.66, 1$

Solve.

14. Mark, Sarah and Lisa found a lost dog at the middle school. Each received \$100 for finding the dog and returning it to its owner. Mark saved $\frac{1}{2}$ of his money, Sarah saved $\frac{2}{3}$, and Lisa saved $\frac{5}{8}$. Who saved the most? Who saved the least?

15. At track practice, Austin, Cory and Darrin ran for 7 minutes. Austin completed $\frac{1}{3}$ of a mile, Cory 0.3 of a mile, and Darrin $\frac{1}{4}$ of a mile. Place them in order from who ran the least to most of the mile.

7.N.1.2 Compare and order rational numbers expressed in various forms using <, >, and =.*Compare the fractions. Write <, > or =.*

1. $\frac{2}{3}$ $\frac{4}{5}$

4. $-\frac{3}{4}$ $\frac{1}{4}$

7. $-\frac{5}{6}$ $-\frac{7}{8}$

2. $-\frac{5}{10}$ $-\frac{1}{2}$

5. $\frac{4}{5}$ $\frac{5}{6}$

8. $\frac{2}{5}$ $\frac{2}{12}$

3. $\frac{1}{4}$ $\frac{3}{6}$

6. $\frac{6}{8}$ $\frac{6}{10}$

9. $-\frac{1}{3}$ $\frac{1}{3}$

Compare the decimals. Write < or >.

10. 0.7 0.755

13. -1.02 -1.20

16. 0.05 0.5

11. -3 -3.02

14. 22.45 23.3

17. -5.26 0.526

12. 2.87 -2.98

15. -0.9 9.1

18. 0.12 1.2

Independent Practice (7.N.1.2)

Name _____

Order the numbers from least to greatest.

19. $1\frac{3}{4}, \frac{9}{4}, \frac{13}{8}, -3.5$

22. $-\frac{7}{9}, -3, -\frac{1}{3}, -13$

20. $-0.3, -0.333, 0.33, 0.3$

23. $-\frac{82}{100}, -\frac{1}{10}, -\frac{4}{50}, -\frac{3}{60}$

21. $0.11, 0.01, 0.10, 0.101$

24. $0, -42, 0.5, -16.3$

Solve.

25. A fruit stand at the Farmers' Market had $\frac{1}{3}$ apples, $\frac{1}{6}$ pears, $\frac{2}{5}$ oranges, and $\frac{5}{8}$ bananas. The stand ran out of fruit beginning with the least amount of fruit to the greatest amount. Place the separate fruits in order from least to greatest.

26. At the mechanic's shop, they determined that each of the tires on your mom's car has remaining tread of 0.56, 0.09, 0.97, 0.76 inches. Place the tires in order from least amount of tread to the most amount. Which tire has the least amount of tread?

Compare the fractions. Write $<$, $>$ or $=$.

1. $\frac{1}{3}$ $\frac{1}{4}$

2. $\frac{3}{5}$ $\frac{6}{10}$

3. $-\frac{7}{8}$ $-\frac{3}{6}$

Compare the decimals. Write $<$ and $>$.

4. -6.23 -8.12

5. 2.1 2.01

6. 0.19 0.004

Convert the following ratios to their equivalent decimal and identify as terminating or repeating

Natural Number or Ratio	Decimal	Terminating or Repeating
7. $\frac{1}{6}$		
8. $\frac{1}{12}$		
9. $\frac{7}{8}$		

Solve.

10. Kaylee wants to improve her free throw. On Monday, she practiced $\frac{7}{8}$ of the day, Wednesday $\frac{4}{5}$ of the day, and $\frac{2}{3}$ of the day on Friday. On which of these days did she practice neither the most or the least?

7.N.1.3 Recognize and generate equivalent representations of rational numbers, including equivalent fractions.

Real-World Connections

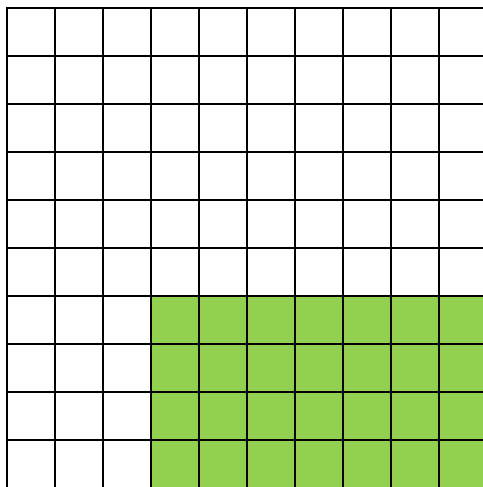
Why is it necessary to recognize and create equivalent representations of rational numbers and equivalent fractions outside of the classroom? If you need to know how much a shirt costs after a 25% discount, it is easier to multiply using the decimal form. When finding the unit rate or determining if something is proportional, you need fractions. Not knowing if the fraction $\frac{1}{5}$ is equal or equivalent to $\frac{6}{30}$ could lead you to believe $\frac{6}{30} > \frac{4}{5}$ because 6 and 30 are bigger than 4 and 5. Today you will identify and create examples of equivalent representations of rational numbers, including equivalent fractions.

Vocabulary

equivalent fractions fractions with the same value

Example:

Model



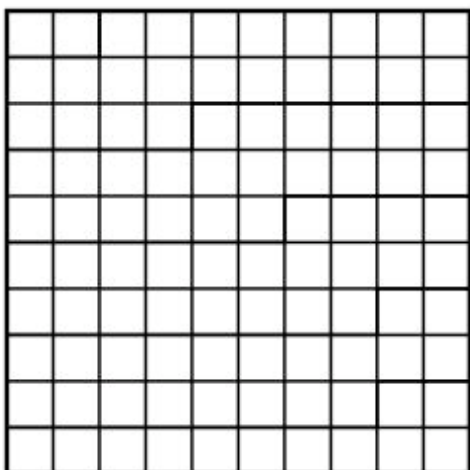
Fraction	Equivalent Fraction	Decimal	Percent
$\frac{28}{100}$	$\frac{28}{100} \div \frac{4}{4} = \frac{7}{25}$	$28 \div 100 = 0.28$	28%

Guided Practice (7.N.1.3)

Name _____

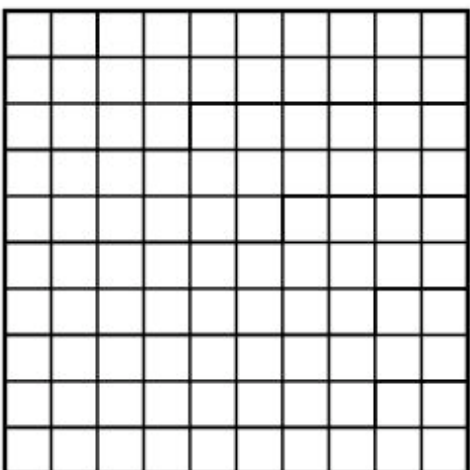
Explain Example

1. Model



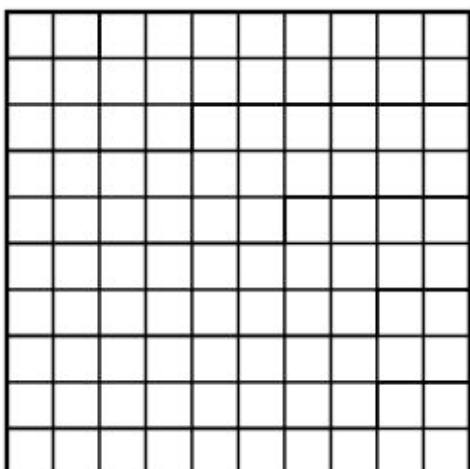
Fraction	Equivalent Fraction	Decimal	Percent
		0.32	

2. Model



Fraction	Equivalent Fraction	Decimal	Percent
$\frac{44}{100}$			

3. Model



Fraction	Equivalent Fraction	Decimal	Percent
			55%

Fill the charts with the information provided.

4. Jody wants to figure out how he spends his time. Currently, he spends 12 days out of a 30-day month practicing the piano. How much of the month does he spend practicing in terms of percent, decimal, and fraction?

Percent	Decimal	Fraction

5. Jody thinks his piano playing sounds good, but would sound better with more practice. If he increases his practice days to 60%, how much of the month would he spend practicing the piano in terms of percent, decimal, and fraction?

Percent	Decimal	Fraction

- 6.-10. For income this year, the Math Club will have two fund raisers, a car wash and selling candy bars. The league will have expenses of team t-shirts and two local meets. Calculate the percent, decimal, and fraction for each income and expense. (Hint: start with the total income).

Income	Per Month	Percent	Decimal	Fraction
Selling Candy Bars	\$600			$\frac{600}{1050}$
Car Wash	\$450		0.4285	
Total				
Expenses	Per Month	Percent	Decimal	Fraction
Meet #1	-\$250			
Meet #2	-\$300			$\frac{300}{925}$
Team Shirts	-\$375			
Total				

7.N.1.3 Recognize and generate equivalent representations of rational numbers, including equivalent fractions.

Complete the equivalent fractions (equal ratios).

1. $\frac{3}{4} = \frac{\quad}{12}$

4. $\frac{1}{3} = \frac{3}{\quad}$

2. $\frac{5}{6} = \frac{15}{\quad}$

5. $\frac{2}{5} = \frac{\quad}{25}$

3. $\frac{7}{8} = \frac{\quad}{40}$

6. $\frac{8}{10} = \frac{\quad}{90}$

Find the equivalent fractions in simplest form.

7. $\frac{20}{25} = \frac{\quad}{5}$

10. $\frac{25}{100} = \frac{\quad}{\quad}$

8. $\frac{4}{16} = \frac{\quad}{4}$

11. $\frac{63}{72} = \frac{\quad}{\quad}$

9. $\frac{36}{30} = \frac{6}{\quad}$

12. $\frac{14}{28} = \frac{\quad}{\quad}$

Independent Practice (7.N.1.3)

Name _____

Fill the chart with the following information.

- 13.-20. Ryleigh's mom creates a budget with the family income and expenses for the month. She uses a percent to see how money is earned and spent. Complete the budget chart by converting the percents into decimals and fractions. (Hint: begin with their total income).

Income	Per Month	Percent	Decimal	Fraction
Mom	\$700			$\frac{700}{1550}$
Dad	\$850		0.5484	
Total				
Expenses	Per Month	Percent	Decimal	Fraction
Rent	-\$400		0.4	
Water	-\$50			$\frac{50}{1000}$
Electric	-\$250			
Food	-\$300			
Total				

Order the numbers from least to greatest.

1. $\frac{5}{8}, 0.5, \frac{2}{3}, 0$

2. $0, -1.23, 0.26, -5$

3. $\frac{2}{3}, \frac{1}{12}, \frac{1}{4}, \frac{1}{6}$

Convert the following ratios to their equivalent decimal and identify as terminating or repeating.

Natural Number or Ratio	Decimal	Terminating or Repeating
4. $\frac{7}{12}$		
5. $\frac{1}{4}$		
6. $\frac{2}{6}$		

Compare. Write $>$, $<$, or $=$.

7. $\frac{1}{3} \bigcirc \frac{1}{4}$

8. $\frac{2}{3} \bigcirc \frac{8}{12}$

9. $0.05 \bigcirc 0.5$

Fill the chart with the following information.

10. Sally currently earns \$20 a day babysitting and \$30 a day at a part-time job. If her income is \$250 for a five-day week, what percent of her income is from babysitting, and what part is from her part-time job? What is the decimal and the fraction?

Job	Percent	Decimal	Fraction
Babysitting			
Part Time Job			

7.N.2.1 Estimate solutions to multiplication and division of integers in order to assess the reasonable results.**Real-World Connections**

Estimation is rounding to achieve an answer or solution with a reasonable result. You might use estimation when shopping to know how much money you will need at the checkout counter. Another example is when you are driving, you can estimate how long it will take to reach your destination.

Vocabulary

estimate	to make an approximate calculation, often based on rounding, $2.3 \approx 2$
solution	the answers to a problem
multiplication	a mathematical operation where a number is added to itself
division	sharing or grouping a number to equal parts
integers	the set of numbers that contains the whole numbers and their additive inverse (opposites)

Estimate by rounding the first number to the nearest tens and multiply.

1. $28(2) \approx$ _____
2. $62(5) \approx$ _____
3. $12(3) \approx$ _____

Estimate by rounding the first number to the nearest hundred and divide.

4. $356 \div 2 \approx$ _____
5. $623 \div 4 \approx$ _____
6. $273 \div 5 \approx$ _____

Round each number to its greatest place value and estimate the product.

7. $98(46) \approx$ _____

8. $306(684) \approx$ _____

9. $837(15) \approx$ _____

Round each number to the greatest place value and estimate the product or quotient.

10. $412(58) \approx$ _____

11. $773(-25) \approx$ _____

12. $546 \div 17 \approx$ _____

13. $2,512 \div 33 \approx$ _____

14. $-356(72) \approx$ _____

15. $-238(-793) \approx$ _____

16. $-1,847 \div -39 \approx$ _____

17. $-42 \div 5 \approx$ _____

7.N.2.1 Estimate solutions to multiplication and division of integers in order to assess the reasonable results.

Estimate by rounding the first number to the greatest place value and divide.

1. $356 \div 4 \approx$ _____

2. $-8,976 \div 9 \approx$ _____

3. $-32 \div -3 \approx$ _____

4. $261 \div -6 \approx$ _____

5. $53 \div 5 \approx$ _____

Round each number to its greatest place value and estimate the product. Then calculate to determine accuracy.

	Prediction		Estimation	Multiplication Answer
Example: $87(5)$	450	\approx	$90(5)$	$87(5) = 435$

6. $-25(31) \approx$ _____

7. $-752(-73) \approx$ _____

8. $940(-22) \approx$ _____

9. $96(78) \approx$ _____

10. $-521 \div (-483) \approx$ _____

Answer the following problems.

11. A school needs to buy 8,142 erasers for its students. If the erasers come in packages of 10, about how many packages should the school buy?
- _____
12. Glen's Grocery Store bought 7,025 boxes of cookies. Each box had 6 cookies. About how many cookies did Glen's Grocery Store buy?
- _____
13. A scout troop is collecting box tops for charity. Approximately how many box tops does the troop need to collect every month in the next half a year to reach a goal of 5,380 box tops?
- _____
14. Rounding to the greatest place value, what is the approximate value of -277×48 ?
- _____
15. Rounding to the greatest place value, what is the approximate value of $-608 \div -18$?
- _____

Circle the best answer.

16. Trent borrowed \$207 from his friend Garrett to advertise his lawn mowing business. Trent earned six times the amount he borrowed in the first month of mowing lawns. About how much did Trent earn in his first month?
- A \$40
- B \$ 600
- C \$1,200
- D \$1,300

Answer the following problems.

17. A submarine's elevation changes -659 feet over 6 minutes. If the submarine descended at a constant rate, what is the approximate elevation change per minute?
- A 100 feet
 - B 110 feet
 - C -100 feet
 - D -110 feet
18. Connor has 4 cases of cantaloupes. Each case contains between 24 and 28 cantaloupes. Each cantaloupe weighs between 1 and 3 pounds. Connor estimates the total weight of all 4 cases to be 104 pounds. Is this a reasonable estimate?
- A No, the estimate should be higher.
 - B No, the estimate should be lower.
 - C Yes, the estimate is reasonable.
 - D Yes, but the estimate should be lower.
19. Trevor is downloading 12 songs on his computer. The length of each song is between 3 minutes and 5 minutes. Trevor estimates the total number of minutes to be 50. Is his estimate reasonable?
- A No the estimate should be higher.
 - B No, the estimate should be lower.
 - C Yes, the estimate is reasonable.
 - D Yes, but the estimate should be lower.
20. What is the approximate value of the expression below?
- $$-844 \times 35 =$$
- A -32,000
 - B 34,000
 - C -33,600
 - D 33,600

Compare the following fractions and decimals. Write $<$, $>$, $=$

1. $\frac{12}{48}$ $\frac{6}{24}$

2. 0 -8.25

3. -0.75 $-\frac{3}{4}$

Complete the equivalent fraction.

4. $\frac{1}{4} = \frac{\quad}{16}$

5. $\frac{11}{12} = \frac{88}{\quad}$

6. $\frac{4}{5} = \frac{\quad}{35}$

Compare the following fractions and decimals. Write $<$, $>$, $=$.

7. $\frac{32}{100}$ $\frac{1}{3}$

8. $\frac{3}{6}$ $\frac{2}{5}$

9. 0.84 8.4

10. $-\frac{2}{24}$ $-\frac{6}{72}$

7.N.2.2 Illustrate multiplication and division of integers using a variety of representations.

Real-World Connections

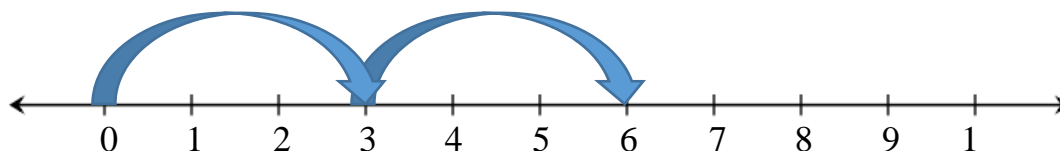
What is multiplication and division of integers? It is multiplying and dividing positive and negative numbers. Multiplying and dividing positive integers happens every day. For example, if you have 12 donuts and there are 6 people, how many donuts each person receives is division. If there are 6 people and each person will receive 2 donuts, how many donuts should be purchased is solved with multiplication. Multiplying or dividing negative integers is used when there is money owed to someone, changes below sea level, temperature below zero, and loss of yards in football.

Vocabulary

estimate	to make an approximate calculation, often based on rounding, $2.3 \approx 2$
solution	the answers to a problem
multiplication	a mathematical operation where a number is added to itself
division	sharing or grouping a number to equal parts
integers	the set of numbers that contains the whole numbers and their additive inverse (opposites)
grouping symbols	dividing things into equal groups or sets with symbols and signs that are commonly used to represent values, equality, operations, grouping and mathematical terms

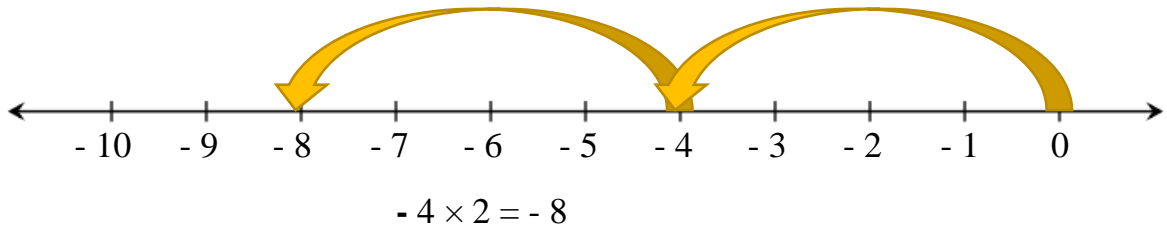
Multiplication and division of integers are illustrated in a variety of ways. Use the following examples to help you represent each expression.

Example 1: 3 groups \times 2 triangles =  = 6 triangles
 $3 \times 2 =$ start at 0, move 3 spots 2 times, stop 6



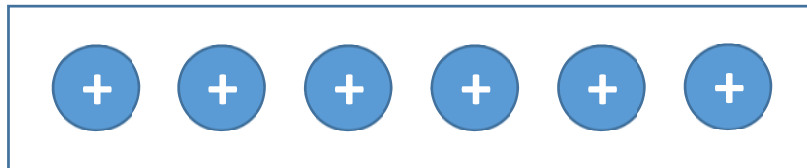
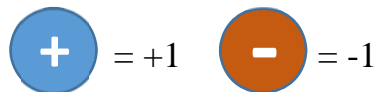
Example 2: $-4 \times 2 =$

Two equal-sized moves backwards of -4. Start at zero. Stop on -8.



Example 3: $6 \div 2 =$

Use counters to represent the division problem.

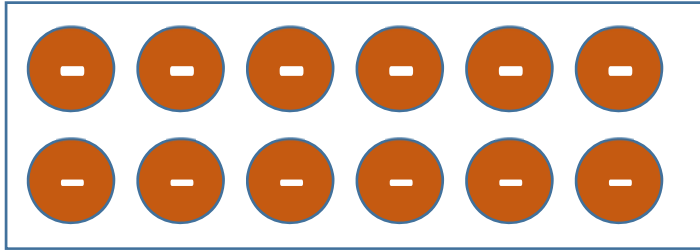


Circle the two equal groups of the 6 positive counters.

How many are in each group? $= +3$ So, $6 \div 2 = 3$

Example 4: $-12 \div 4 =$

Sara has 12 weeds to pull out of the flowerbed. Three of her friends will come over to help. Use the counters to show how many weeds each friend needs to pull.

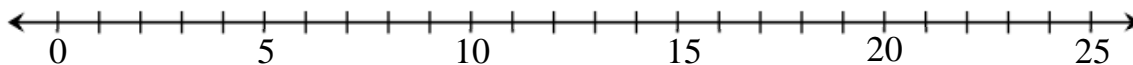


Circle 4 equal groups. How many weeds did the 3 friends and Sara each pull out of the flowerbed?

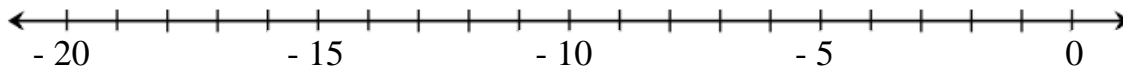
$$-12 \div 4 = -3 \text{ weeds}$$

Model each multiplication problem with the number line provided.

1. $8 \times 3 =$



2. $-9 \times 2 =$



Model each division problem with counters. Let $\oplus = 1$ positive counter, and $\ominus = -1$ negative counter.

3. $10 \div 2 =$

4. $-6 \div 2 =$

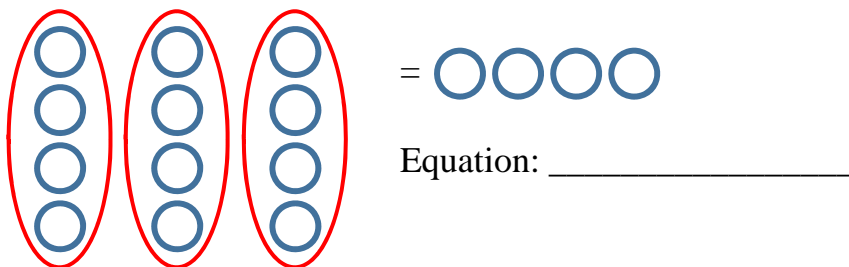
Read the scenario. Set up the correct multiplication or division problem, and use a model to support your expression.

5. Bobby has 416 cookies. He packed them into bags of 8 cookies each. How many bags of cookies does he have in the end?

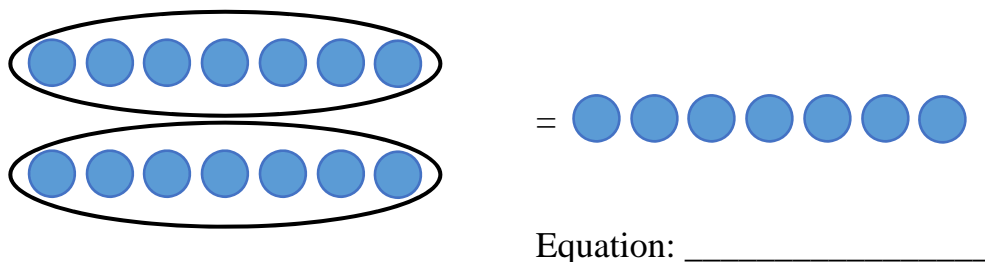
These symbols represent positive and negative integers:

$\bullet = +1$ $\circ = -1$

6. What equation does the following model illustrate?

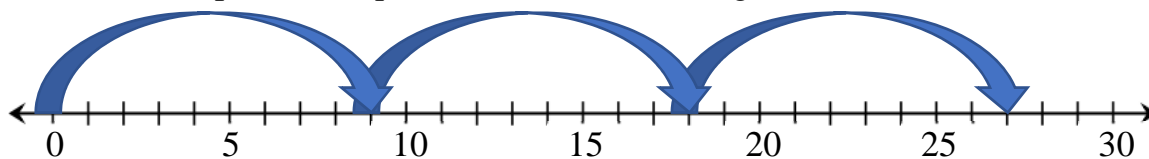


7. What equation does the following model illustrate?



Choose the best answer.

8. Which multiplication equation does the following number line illustrate?



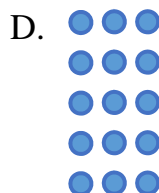
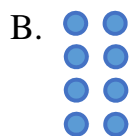
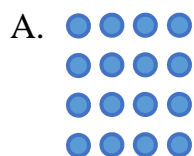
- A $4 \times 6 = 24$
- B $-4 \times 6 = -24$
- C $-9 \times 3 = -27$
- D $9 \times 3 = 27$

Solve.

9. Create an array to illustrate 7×4 .

Choose the best answer.

10. Which of the following correctly models 4^2 ?



7.N.2.2 Illustrate multiplication and division of integers using a variety of representations.

Model each multiplication or division expression with pictures or number line.

1. $48 \div (-6) = \underline{\hspace{2cm}}$

2. $3 \times 3 = \underline{\hspace{2cm}}$

Find each product and quotient.

3. $(2)(-7)(-3) = \underline{\hspace{2cm}}$

4. $(-7)(-6) = \underline{\hspace{2cm}}$

5. $18 \div 3 = \underline{\hspace{2cm}}$

6. $(2)(-6)(3)(-7) = \underline{\hspace{2cm}}$

7. $-155 \div -155 = \underline{\hspace{2cm}}$

8. $11(2)(-2) = \underline{\hspace{2cm}}$

Read each scenario, set up the correct multiplication or division problem and model to support your expression.

9. Carl has \$48. Shawn has half as much money as Carl. How much money does Shawn have?

10. Sam's allowance has increased \$8 in 4 years. If each year, he received an equal amount how much was his raise each year?

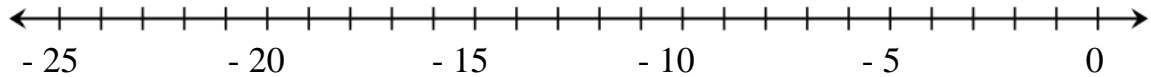
Solve.

11. Use repeated addition to model -4×5 .



Solve.

12. Sawyer has \$17 in his wallet. Tiffany has twice as much money in her pocket as Sawyer. How much money does Tiffany have? Write an equation and solve.
- _____

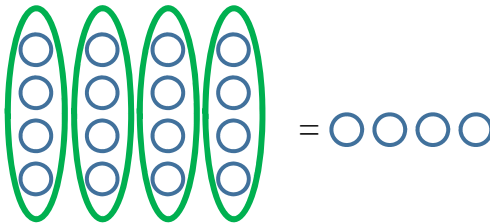
13. Use the following number line to find $(-21) \div 7$. Draw jumps and write the equation.





14. Create a number line and draw jumps to show $5 \times 3 = 15$.

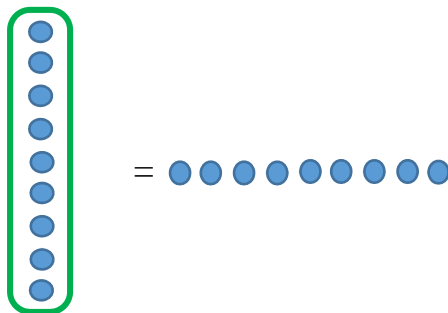
15.  = +1  = -1

What equation does the following model illustrate?



16.  = +1  = -1

What equation does the following model illustrate?



Independent Practice (7.N.2.2)

Name _____

Find the quotient or product.

17. $-68 \div 4 = \underline{\hspace{2cm}}$

18. $-5(2)(-5)(2) = \underline{\hspace{2cm}}$

19. $13(4)(6)(-1) = \underline{\hspace{2cm}}$

20. $-144 \div 3 = \underline{\hspace{2cm}}$

Round each number to its greatest place value and estimate the product.

1. $726(7) \approx$

2. $36(20) \approx$

3. $897(15) \approx$

Compare the fractions and write $<$, $>$, and $=$

4. $\frac{5}{12} \boxed{} \frac{4}{5}$

5. $\frac{2}{5} \boxed{} \frac{2}{10}$

6. $\frac{5}{6} \boxed{} \frac{10}{12}$

Compare the decimals and write $<$ and $>$

7. $0.75 \boxed{} 0.875$

8. $0.56 \boxed{} -7.3$

9. $0.66 \boxed{} 0.4$

Read the scenario, set up the correct multiplication or division problem and model to support your expression.

10. Granny is shrinking! Her height decreases by 14 centimeters over 7 years. She wants to predict the total change in her height over the next 168 months. How can you help her calculate it?

7.N.2.3 Solve real world and mathematical problems involving addition, subtraction, multiplication and division of rational numbers; use efficient and generalized procedures including but not limited to standard algorithms.

Real-World Connections

Every day you encounter problems. Some are mathematical, and others are not. However, applying problem solving skills used in math may solve both. You use math problem solving skills to determine the unit cost of an item, how much money you need to buy an item, the price of an item after discounts are applied, and how to enlarge recipe ingredients to make a larger quantity. In this lesson, you will experience real world problems using one or more, addition, subtraction, multiplication, and division skills to evaluate the solution and justify the answer.

Vocabulary

real-world mathematical problems	math problems that teach standards through topics students will likely experience in their world
addition	to join two or more numbers or quantities to get one number called sum or total
subtraction	to reduce one quantity from another ($x - y$)
standard algorithms	specific methods usually used for solving math problems
quantity	amount, number of, total, sum, size or extent; indicates how much or how many

Read the following scenarios, set up the problem using multiplication, division, addition, or subtraction and justify your solution (use illustrations, models or standard algorithms).

1. Emma wants to make cookies to take to her 7th grade dance. She has $9\frac{4}{5}$ cups of flour. She can make one batch of cookies with $2\frac{1}{3}$ cups of flour. How many batches can Emma make with the flour she has?

Read the following scenarios, work the problem using multiplication, division, addition, or subtraction and justify your solution (use illustrations, models or standard algorithms).

2. Tammy makes \$6.50 an hour babysitting. She works 20 hours a week. How much money does she make in a week?

3. The students in Mrs. Hill's class would like to buy her a gift for Teacher Appreciation Day. There are 28 students in the class. The gift is \$30. How much will each student need to bring to class to buy the gift?

4. Sophie had \$40.00 in her savings. Her mother gave her another \$10.00, and her grandmother gave her \$25.00. She spent \$30 on a pair of shoes. Sophie wants to buy a dress that costs \$27.50. Will Sophie have enough money in savings to buy her dress?

5. Brooke must run 3 laps for every free throw she misses in a game
A. If she ran 12 laps, how many free throws did she miss?

- B. If she missed 6 free throws, how many laps must she run?

Read the following scenarios, work the problem using multiplication, division, addition, or subtraction and justify your solution (use illustrations, models or standard algorithms).

6. Lincoln Middle School currently has 4,496 ounces of creamy peanut butter in the cafeteria. They also have 37 ounces of crunchy peanut butter. How many ounces of peanut butter do they have in total?

7. A cell phone company has a total of 89,934 customers across the world. If 25,790 of its customers live in the United States, how many of its customers live in other countries?

8. A professional soccer player on the same team for 7 years earned \$484,859 per year. How much did he earn in total playing soccer during those 7 years?

9. A group of 286 teens need to take shuttle vans to the concert. If each van can take 13 teens, how many vans are needed?

10. Maryann can buy markers in packages of 3 for \$4.32 or in packages of 2 for \$3.34. How much money does she save by buying 12 markers at the better price?

7.N.2.3 Solve real world and mathematical problems involving addition, subtraction, multiplication and division of rational numbers; use efficient and generalized procedures including but not limited to standard algorithms.

Read the following scenarios, work the problem using multiplication, division, addition or subtraction and justify your solution (illustrations, models or standard algorithms).

1. Steve charges \$25 to mow lawns that take 1 hour to mow and \$10 for each additional hour. How much will he earn on a yard that requires 4 hours to mow. Is this reasonable? Why or Why not?

2. Sophia climbed rocks at the rock climbing gym for 130 minutes over 4 days. If she climbed the same amount of time each day, how many minutes did she spend climbing per day?

3. Jackson's soccer coach filled the teams' water container with 40 quarts of water. Since 32 ounces equal 1 quart, how many times can a soccer player fill a 16-ounce water bottle before using all the water?

4. Kelsey ran the 40-meter track at her school in 91.4 seconds. Running at the same speed, how long did it take her to run 100 meters?

Read the following scenarios, work the problem using multiplication, division, addition or subtraction and justify your solution (illustrations, models or standard algorithms).

5. Mario has saved \$240 to buy a phone. This represents $\frac{8}{10}$ of the cost of the phone. Find the cost of the phone.

6. Jack and his two brothers want to buy their mother a gift for Mother's Day. The gift will cost \$50. How much money must each brother contribute to share cost equally?

7. Macy makes \$8.50 per hour giving private swimming lessons. If she works 16 hours per week, how much will she make in one week?

8. The temperature at sunrise in Okmulgee on a February morning was -15°F . The temperature increased 37°F by noon. What was the temperature at noon?

9. Chris bought a small bag of popcorn and a medium drink for six of his friends and himself. If Chris spent \$41.30 for seven people, how much did it cost for one person?

10. A lawn mowing service charges \$100 per visit plus \$40.00 per hour. How much would the service charge for a yard that takes $4\frac{1}{2}$ hours to mow?

11. If a roll of paper towels cost \$0.96, how much would 9 rolls cost?

Read the following scenarios, work the problem using multiplication, division, addition or subtraction and justify your solution (illustrations, models or standard algorithms).

12. Kendall bought 12 packs of green bouncy balls and 8 packs of purple bouncy balls. Each pack contained a dozen bouncy balls. How many more green bouncy balls than purple bouncy balls did Kendall buy?

13. Camber's father gave her \$185. She purchased 11 journals for her friends. Each journal cost \$7. How much money does Camber have left?

14. Micah lost \$0.75 in the vending machine five times during the school year. Which value below represents Micah's total loss?

- A -\$3.75
- B \$3.75
- C -\$4.55
- D -\$3.50

15. Ricky ordered a spinach salad for \$5.60, a chicken sandwich for \$6.89, a lemonade for \$2.10, and an oatmeal cookie for \$0.85. How much does Ricky owe for his lunch?

16. In June the temperature in Antarctica was -70°F at noon. By 1:00 p.m. the temperature had dropped 5 degrees. Forty-eight hours later, the temperature had risen 13 degrees. When last taken, what was the temperature?

Read the following scenarios, work the problem using multiplication, division, addition or subtraction and justify your solution (illustrations, models or standard algorithms).

17. Chasidy wants to buy a book about owls that costs \$16, a cookbook that costs \$17, and a composition book that costs \$4. She has saved \$28 from her allowance. How much more money does Chasidy need to buy all three books?

18. The table below shows Andre's deposits and withdraws made to his bank account.

Action	Amount
deposit	\$35
withdraw	\$10
deposit	\$27
deposit	\$83
withdraw	\$150

If there was originally \$120 in Andre's bank account, what was his final bank account balance?

19. Mr. Black gave out three pizzas. Each pizza had eight slices. Six slices were not eaten. How many slices of pizza were eaten?

20. The school cafeteria has 9 round tables and 7 rectangular tables. Each round table has 8 chairs and each rectangular table has 6 chairs. How many chairs are there in all?

Find the equivalent fraction.

1. $\frac{3}{4} = \frac{36}{\quad}$

2. $\frac{1}{3} = \frac{\quad}{39}$

3. $\frac{7}{8} = \frac{77}{\quad}$

Estimate by rounding to the greatest place value and divide.

4. $65 \div 12 \approx \underline{\quad}$

5. $98 \div 10 \approx \underline{\quad}$

6. $191 \div 17 \approx \underline{\quad}$

Find each product and quotient

7. $(-12)(-5)(3) = \underline{\quad}$

8. $4\left(\frac{-6}{12}\right) = \underline{\quad}$

9. $81 \div 3 = \underline{\quad}$

Solve.

10. Koby was making a cake. The recipe called for $\frac{2}{5}$ cup sugar, $\frac{7}{8}$ cup flour, and $\frac{3}{10}$ cup milk. Which ingredient was used the most and which ingredient was used the least?

Most: _____

Least: _____

7.N.2.4 Raise integers to positive integer exponents.
Real-World Connections

You will use exponents when working with very large and very small numbers. It is a shorter way to write and calculate problems. Scientists use them when recording large measurements such as the distance to space and small items that can only be seen in a microscope. Can you think of any other time that people might use numbers with exponents? You could use exponents in real life when you calculate the area of a square. If you say, "My room is eight feet by eleven feet square", you mean your room is 8 feet \times 11 feet. This can be written as 88 feet². A room that is 8 feet by 8 feet is 64 feet².

Vocabulary

exponent the number that indicates how many times the base is used as a factor, e.g., in $4^3 = 4 \times 4 \times 4 = 64$, the exponent 3, indicating that 4 is repeated as a factor three times

Complete the following chart with positive and negative exponents.

	Numerals	Factors	Product
Example	5^3 3^1	$5 \times 5 \times 5$ 3	125 3
1.	6^2		
2.	$(-12)^2$		
3.	$(-10)^3$		
4.	7^3		
5.	11^1		

Write the expression using an exponent, and then give the product.

6. $3 \times 3 = \underline{\hspace{1cm}} = \underline{\hspace{1cm}}$
7. $4 \times 4 \times 4 = \underline{\hspace{1cm}} = \underline{\hspace{1cm}}$
8. $-8 \times -8 \times -8 = \underline{\hspace{1cm}} = \underline{\hspace{1cm}}$
9. $-12 \times -12 = \underline{\hspace{1cm}} = \underline{\hspace{1cm}}$
10. $8 = \underline{\hspace{1cm}} = \underline{\hspace{1cm}}$

7.N.2.4 Raise integers to positive integer exponents.

Complete the following chart using expanded form with positive exponents and solve.

	Numerals	Factors	Product
Example	$(-8)^2$ 3^3	$(-8) \times (-8)$ $3 \times 3 \times 3$	64 27
1.	4^3		
2.	$(-10)^2$		
3.	$(-6)^3$		
4.	$(-9)^1$		
5.	12^2		
6.	5^3		
7.	$(-7)^2$		
8.	$(-2)^3$		
9.	11^3		
10.	100^1		

Write the expression using an exponent and then give the product.

11. $(-15)(-15) = \underline{\hspace{1cm}} = \underline{\hspace{1cm}}$

12. $66 = \underline{\hspace{1cm}} = \underline{\hspace{1cm}}$

13. $(13)(13)(13) = \underline{\hspace{1cm}} = \underline{\hspace{1cm}}$

14. $(-31)(-31) = \underline{\hspace{1cm}} = \underline{\hspace{1cm}}$

15. $84 = \underline{\hspace{1cm}} = \underline{\hspace{1cm}}$

16. $9 \times 9 = \underline{\hspace{1cm}} = \underline{\hspace{1cm}}$

17. $(10)(10)(10) = \underline{\hspace{1cm}} = \underline{\hspace{1cm}}$

18. $17 \times 17 = \underline{\hspace{1cm}} = \underline{\hspace{1cm}}$

19. $(-20)(-20)(-20) = \underline{\hspace{1cm}} = \underline{\hspace{1cm}}$

20. $-16 \times -16 = \underline{\hspace{1cm}} = \underline{\hspace{1cm}}$

Read the following scenarios, work the problem using multiplication, division, addition or subtraction, and justify your solution using illustrations, models or standard algorithms.

1. Tickets to a football game are \$5.00 for adults and \$3.00 for students. The total ticket sales were \$626. How many adults and students attended the game if 50% of the sales were adults and 50% of the sales were students?

2. At the football game, Tommy ran 25 yards on the first play and only needed 15 more for a touchdown. Then, the quarterback was sacked for a loss of 10 yards. The next play was a fumble with another loss of 10. How many yards does Tommy need for a touchdown now?

3. Nate and Sherry want season passes to the pool this summer, but neither have the \$100. Nate gets a job that pays \$6.25 an hour and can work 5 hours a week. Sherry has \$70 in savings and earns \$10 per week walking her neighbor's dog. Who will be able to buy the pool pass first?

Find the value

4. $9^2 =$ _____

5. $(-15)^3 =$ _____

6. $-10^2 =$ _____

Complete the chart below with the equivalent fractions, decimals, and percents.

Fraction	Decimal	Percent
7. $\frac{3}{4}$		
8. $\frac{7}{8}$		
9.		30%
10.	0.25	

7.N.2.5 Solve real world and mathematical problems involving calculations with rational numbers and positive integer exponents.**Real-World Connections**

In the real-world you will discover that multiplication is used to help you add the same number over and over more quickly. For example, $5 + 5 + 5 + 5 + 5 = 25$ is the same as $5 \times 5 = 25$. Exponents make multiplying the same number over and over faster. For example, $3 \times 3 \times 3 \times 3 = 81$ or you can write $3^4 = 81$. Exponents also help you write very large numbers: 1,000,000,000,000,000,000 is 10^{17} . Today, you will calculate real world problems with positive exponents.

**Order of Operations**

G Simplify within Grouping Symbols such as $(\square)\{\square\}[\square]$

E Simplify Exponents

M Perform Multiplication and Division in order from left to right 

S Perform Subtraction and Addition in order from left to right 

Vocabulary

order of operations	a rule for evaluating expressions PEMDAS 1. perform the operations in P arenthesis 2. compute powers and roots (E xponents) 3. perform all M ultiplication and D ivision from left to right 4. perform all A ddition and S ubtraction from left to right
rational numbers	a number expressed as a fraction $\frac{p}{q}$ where p and q are integers, where $p \neq 0$
positive integer exponents	integers are the set of numbers that contain the whole numbers and their additive inverse (opposites); no fractions or decimals; positive integers are the counting or natural numbers in the set; as an exponent, this number indicates how many times the base is used as a factor

Solve the expressions below with exponents.

1. $27 \div \frac{3}{2} + (5.7 - 2.51) + 2 \times 4^2 = \underline{\hspace{2cm}}$

2. $3 + 7^2 \times (8 - 4) \div \frac{1}{2} = \underline{\hspace{2cm}}$

3. $4 - (3^2 + 1) + 5 \times \frac{3}{5} = \underline{\hspace{2cm}}$

For questions 4 and 5, read the scenario, set up the problem, and solve the real-world math problems using rational numbers and positive integers.

4. Olivia has 6^2 apples. She gave half of her apples to Brent. She then gave 13 of her apples to her friends. Olivia decided to sell her remaining apples for \$0.50 each. How much money will Olivia earn if she sells the remaining apples?

5. There are 7^3 cherries on a tree. 7^2 cherries fall to the ground and rot. Noah picks 250 cherries off the tree for a cherry pie. How many cherries remain on the tree?

Solve.

6. Simplify the expression and find the answer.

$$(12 - 4)^2 + 8 - 3 \times 7 + 5^2$$

- A 26
- B 61
- C 76
- D 508

7. Evaluate the expression below for $x = -3$, and $y = 2$, then find the answer.

$$-3(x - 5) + y^2 - 10 \div 2$$

- A 9
- B 23
- C -24
- D -15

8. Solve: $3(8^2) - 3^2$

9. What is the value of $(-5)^3$? _____

10. If $a = 5$, $b = -4$, and $c = 1$, what is the value of this expression: $a^2 + 4bc - 3c$?

7.N.2.5 Solve real world and mathematical problems involving calculations with rational numbers and positive integer exponents.

Solve the expressions below.

1. $9^3 \times 5 \div (25 \times \frac{2}{5}) + 11 - 9.5 =$ _____

2. $60 \div 12 + 6^2 - (104 \div \frac{8}{10}) \times 2 =$ _____

3. $4^3 \div 8 + 7(12.34 - 8.25) - \frac{1}{4} =$ _____

4. $(\frac{6}{5} + \frac{8}{10}) \times 3^3 - 24 =$ _____

5. $3 \times (2.5 \times 5^2) \div 5 + 7 - \frac{6}{8} =$ _____

Read the following scenarios, set up the problem, and solve the real-world math problems using rational numbers and positive integers.

6. Samantha plants 15^2 watermelon seeds. Each seed produces 3 watermelons. Samantha sells $\frac{4}{5}$ of her watermelons to a store. Then Samantha gives 100 of her watermelons to a food bank. She takes the remaining watermelons to the farmer's market and sells them for \$1.50 each. How much money does Samantha make from her watermelons at the farmers' market?

7. Tiffany enjoys reading. There are 12^3 pages in the book she is reading. If Tiffany reads 144 pages a day, how many days will it take for her to complete the book?

Read the following scenarios, set up the problem, and solve the real-world math problems using rational numbers and positive integers.

8. Mason has a giant oak tree in his front yard. It has 9^3 leaves on the tree. All the leaves fall, and Mason rakes them into piles. Mason rakes 9 piles of leaves with equal number of leaves in each pile. How many leaves are in each pile?

9. Renee plans to take a trip from Oklahoma City to Dallas. The car in which she is riding travels at a speed of 8^2 miles per hour. If the distance between the two cities is 205 miles, how long will it take Renee to get to Dallas?

10. Phillip can type 4^3 words per minute. He must type a 1,000-word essay about video games. How long will it take Philip to type the essay?

11. Evaluate the following expression if $a = 3$. $10^a - 5(a + 6)$

12. Solve: $\frac{15^2(3^3 + 3^2)}{5^2}$

13. Terin is preparing her meals for the week. She chops 2^2 carrots, 3^3 broccoli bunches, 4^1 sweet potatoes, and 2^3 zucchinis. How many vegetables in all does she chop?

14. Each sheet of metal is $(\frac{1}{2})^3$ inches thick. If Kelvin stacks 4 sheets on top of each other, how thick will the stack be?

Independent Practice (7.N.2.5)

Name _____

Read the following scenarios, set up the problem, and solve the real-world math problems using rational numbers and positive integers.

15. The farmers' market has 4^2 pounds of string beans and 3^3 pounds of lima beans. How many more pounds of lima beans than string beans does the market have?

Solve.

16. Jaylen used 8^2 cups of flour to bake 16 cakes. How many cups of flour did each cake contain?

17. Evaluate. $\frac{5^2 \times 4^3}{10^2}$

18. Simplify. $\frac{6^3}{3^3}$

19. Simplify. $8^3 \div 4^2 \times 7^2 - 1,568 =$

20. Evaluate. $(12 + 6^2) \div 2 \times 4^2 + (7^3 - 15^1) =$

Round the first number to its greatest place value and estimate the product.

1. $58(5) \approx$

2. $456(3) \approx$

3. $820(8) \approx$

4. $27(4) \approx$

Solve the expressions below with exponents.

5. $10^3 - 900 =$ _____

6. $125 + 5^3 =$ _____

7. $4^2 \div 8 =$ _____

8. $11^2 \times 10^1 =$ _____

Order the numbers from greatest to least.

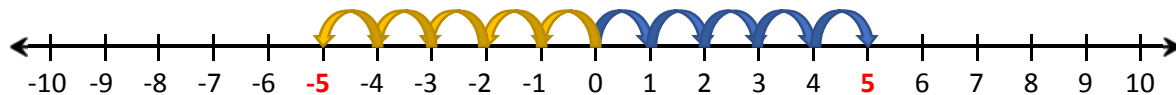
9. $\frac{10}{12} \quad \frac{3}{10} \quad \frac{1}{5} \quad \frac{2}{3}$

10. $0.9 \quad -0.9 \quad -0.09 \quad 0.99$

7.N.2.6 Explain the relationship between the absolute value of rational number and the distance of that number from zero on a number line. Use symbol for absolute value.

Real-World Connections

Absolute value is the distance from zero, but what does that mean? Use the number line above as a reference. If you stand on zero and walk to the number 5, you will take 5 steps. If you stand on zero and walk to -5, you will take 5 steps. Both are the same distance from zero. The absolute value of 5 is written $|5|$. Instead of writing “the absolute value of -5, you can write $|-5|$. $|5|$ and $|-5|$ equals 5, or 5 steps away from zero. Also, $-|5|$ equals 5 steps away from zero.

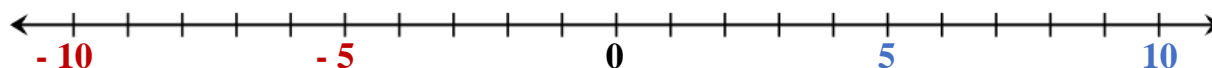


Using absolute value is helpful in calculating distances (do you have enough gas to get there and back?), or in sports (how many consecutive 15-yard penalties can the referee call before it becomes half the distance to the goal?)

Vocabulary

absolute value	the absolute value of a real number is its distance from 0 on a number line
distance	the length between two points (or objects)
zero	the numeral 0, used as a place holder (nothing, none, nil, naught)
number line	a line in which numbers are marked at intervals

Simplify the following absolute value problems. Use the number line if needed.



1. $|-10| = \underline{\hspace{2cm}}$

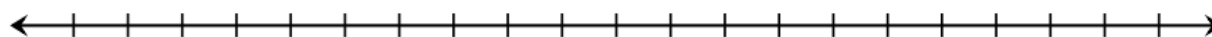
3. $|37| = \underline{\hspace{2cm}}$

5. $|-88| = \underline{\hspace{2cm}}$

2. $|22| = \underline{\hspace{2cm}}$

4. $-|7| = \underline{\hspace{2cm}}$

6. $|3| = \underline{\hspace{2cm}}$



7. $|-52| + |15| = \underline{\hspace{2cm}}$

9. $|29| - |20| = \underline{\hspace{2cm}}$

8. $|-17| - |9| = \underline{\hspace{2cm}}$

10. $|60| - |35| = \underline{\hspace{2cm}}$

Read the following scenarios and write the expression requested in each problem.

11. The day's temperature starts at -5°F . The sun comes out and the temperature increases to 30°F . When the sun sets the temperature begins to drop back to -5°F . Use absolute value to express the range in temperature.

12. The school swim team has a high dive. It is 33 feet high. The average diver reaches a depth of 13 feet. What is the total distance of the dive as an absolute value?

13. Jake is climbing a mountain. It will take two days to complete his hike. On the first day, he hikes 6,321 feet, and sets up camp to sleep on the summit. The next morning, he begins his 6,321-foot descent to the bottom. What is the total number of feet of Jake's hike as an absolute value?

7.N.2.6 Explain the relationship between the absolute value of rational number and the distance of that number from zero on a number line. Use symbol for absolute value.

Simplify the following absolute value problems.

1. $|15| + |-15| =$ _____

5. $-|33| + -|25| =$ _____

2. $|30| + |7| =$ _____

6. $|98| + |10| =$ _____

3. $|24| - |28| =$ _____

7. $|5| + |8| =$ _____

4. $-|40| + |20| =$ _____

8. $|10| - |6| =$ _____

Read the following scenarios and write the expression requested in each problem.

9. Mary is flying to her grandparents' house in Texas from Tulsa. On the flight the captain says, "We've reached our cruising altitude of 36,000 feet." before switching off the seat belt sign." What is the altitude of the plane written as an absolute value?

10. A few minutes into Mary's trip the plane experiences turbulence, and the plane descends from the 36,000 feet cruising altitude to 25,000 feet. How is the decrease in altitude expressed as an absolute value?

Simplify the following expressions.

11. When $x = -10$, what is the value of $|x - 6|$?

12. What is the value of $|n - 5|$ when $n = 2$?

13. What is the value of $|x + 2|$ when $x = -9$?

14. Evaluate the following expression when $n = -3$.

$$2|3 - 7n| + |2|$$

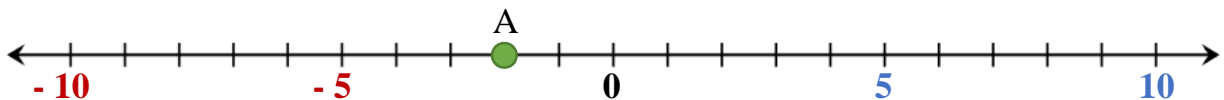
15. Evaluate the following expression when $n = 5$.

$$|3n - 8| + |-5|$$

16. Evaluate the following expression when $n = 6$.

$$|n - 8| - |2 - n|$$

17. Use the number line to find the absolute value of "A".

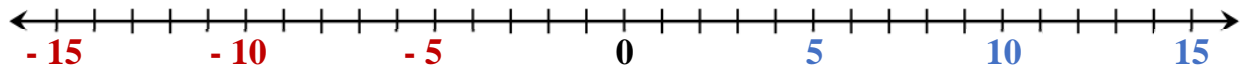


Independent Practice (7.N.2.6)

Name _____

18. Plot these values on the number line given.

$$|-3| \quad |7| \quad |8 - 12| \quad |-7 - 2|$$

*Solve.*

19. A football team ran three plays. On the first play, the quarterback was tackled for -9 yards. On the second play, the running back ran for $12\frac{1}{2}$ yards, and on the third play the quarterback ran for 6 yards. What is the distance and on which play has the greatest absolute value?

20. Create a number line and plot the following values.

$$-|-8| \quad |-3 + 16| \quad -|9 - 12| \quad |-4 + -6|$$

Solve the expressions below with exponents.

1. $4^2 + 22 =$ _____

3. $10^2 \times 5 =$ _____

5. $6 + 2^3 =$ _____

2. $9^3 - 10 =$ _____

4. $4^2 \div 8 =$ _____

Read the following scenarios and write the expression requested in each problem.

6. Nancy made $\frac{11}{12}$ of a quart of lemonade. Her friend and she drank $\frac{2}{10}$ of a quart of the lemonade. How much lemonade is left?

7. A deep-sea diver is 10 feet below sea level, 0, for 15 minutes. He descends 10 more feet. Use absolute value to find the diver's distance from zero or sea level.

8. A museum gallery in Oklahoma City has different size spaces for rent. A small 8×8 space rents for \$50. A medium 12×12 space rents for \$75. A large 16×16 space rents for \$100. Mary needs 528 square feet for her paintings. Using exponents, create a combination of spaces she could rent for her show and the cost. Explain your results.

9. Yesterday in science class, Sade was observing a cell. Every hour the cell increases by a multiple of 4. If she started with four cells, at the end of one hour she would have sixteen cells. Write the expression in exponential form and evaluate her observation after 2 hours.

10. The school library contains 1,000 books. How many books in exponential form are in the school library?

7.A.1.1 Describe that the relationship between two variables , x and y, is proportional if it can be expressed in the form $\frac{y}{x} = k$ or $y = kx$; distinguish proportional relationships from other relationships, including inversely proportional relationships ($xy = k$ or $y = \frac{k}{x}$).

Real-World Connections

A proportional relationship is a relationship between ratios that are equal. For example, a job may pay \$15 per hour. The relationship is directly related. Pay increases as hours increase. Pay decreases as hours decrease. The opposite is inversely proportional. If your house is being painted and you have 1 painter, the job takes 4 hours, or if you have 4 painters it will take only 1 hour. The proportion is fewer painters equals more time to paint and more painters equals less time to paint.

Vocabulary

variable	a quantity that can change or may take on different values
proportional relationships	an equation that states two ratios are equivalent
inverse relationships	operations that undo each other (e.g., addition and subtraction are inverse operation; multiplication and division are inverse operations)
inversely proportional relationships	when one value decreases at the same rate the other increases or the value increases at the same rate as the other decreases

Guided Practice (7.A.1.1)

Name _____

Given the following scenarios, identify if the relationship of the two variables, x and y are proportional, directly or inversely. Then solve the equation for the constant of proportionality and for the corresponding value of y .

1. You are paid \$15 an hour. This is the constant of proportionality because how much you get paid an hour does not change. It is constant. When the number of hours you work increase, your earnings increase.

$$y = kx \text{ or earnings} = \$15 \times \text{hours worked}$$

- A Use the direct proportionality equation to calculate 5 hours.

- B Find the value for k if y is directly proportional to x , and $y = 24$ when $x = 4$.

- C Using the hourly pay from B, what is the value of y when $x = 3$?

Given the following scenarios, identify if the relationship of the two variables, x and y are proportional, directly or inversely. Then solve the equation for the constant of proportionality and for the corresponding value of y .

2. Your house needs to be painted. The painter shows up and says if he paints your house alone it will take 20 hours. If he brings his team of four painters, it will take only 5 hours. The y is inversely proportional to x or y is directly proportional to $1/x$. The number of people painting and the time needed to paint the house are inversely proportional because the more people painting the less time it takes to paint the house.

$$y = \frac{k}{x} \text{ or } y = \text{time, } x = \text{number of people}$$

- A Use the inverse proportionality equation to calculate 8 painters

- B y is inversely proportional to x , and $y = 20$ when $x = 2$

- C given the same total hours needed as in B, what is the value of y when $x = 4$? Is this possible? Why?

Solve.

3. y is directly proportional to x . If $y = 30$, when $x = 6$, find the value of x when $y = 45$.

4. In a direct variation, $y = 16$ when $x = 8$. Write a direct variation equation that shows the relationship between x and y . Remember to use $y = kx$.

Answer the following questions.

5. In a direct variation, $y = 10$ when $x = 2$. Write a direct variation equation that shows the relationship between x and y . Remember to use $y = kx$.

6. In a direct variation, $y = 40$ when $x = 80$. Write a direct variation equation that shows the relationship between x and y . Remember to use $y = kx$.

7. Speed and time are inversely proportional because as the speed increases, the time it takes to reach the destination decreases. Three workers built a wall in 12 hours. How long would it have taken for 6 equally skilled workers to build the wall?

$$y = \frac{k}{x} \quad y = \text{time and } x = \text{number of workers}$$

Use inverse proportionality to calculate time for 6 workers.

8. It takes 14 hours for a faucet with a flow of 18 liters per minute to fill a reservoir with water. How long will it take if the flow is reduced to 7 liters per minute?

Use $y = \frac{k}{x}$

9. Which equation shows direct variation? Circle your answer.

$$y = \frac{3}{x} \quad \text{OR} \quad y = 79x$$

10. Which equation shows inverse variation? Circle your answer.

$$y = 24x \quad \text{OR} \quad \frac{-19}{x} = y$$

7.A.1.1 Describe that the relationship between two variables, x and y , is proportional if it can be expressed in the form $\frac{y}{x} = k$ or $y = kx$; distinguish proportional relationships from other relationships, including inversely proportional relationships ($xy = k$ or $y = \frac{k}{x}$).

Identify if the relationship of the two variables, x and y are proportional, directly or inversely, and solve the equation for the constant of proportionality and for the corresponding value of y .

Example: <u>Direct</u> Proportional Relationship Multiplication $k = \text{constant}$ $y = kx$ $y = \text{earnings}$ $x = \text{hours}$	Example: <u>Inversely</u> Proportional Relationship Division $k = \text{constant}$ $y = \frac{k}{x}$ $y = \text{time}$ $x = \text{number of people}$
--	---

- y is directly proportional to x , and $y = 48$ when $x = 8$. What is the value of y when $x = 4$ and $x = 10$?

- y is directly proportional to x , and $y = 84$ when $x = 7$. What is the value of y when $x = 5$ and $x = 9$?

- y is inversely proportional to x , and $y = 40$ when $x = 6$. What is the value of y when $x = 4$ and $x = 8$?

- y is inversely proportional to x , and $y = 500$ when $x = 10$. What is the value of y when $x = 5$ and $x = 15$?

Independent Practice (7.A.1.1)

Name _____

Identify if the relationship of the two variables, x and y are proportional, directly or inversely, and solve the equation for the constant of proportionality and for the corresponding value of y .

5. Speed and travel time are inversely proportional. As speed goes up, travel time goes down, or as speed goes down, travel time goes up. If you travel 191 miles in 2 hours, how fast are you driving, and are you speeding? If you travel 75 mph (miles per hour), how long will it take to go 191 miles?

6. The cost of insurance on a house is directly proportional to the area of the house. Mike has a 1,500 square-foot house and pays a monthly insurance premium of \$57.00. Nancy has a 2,800 square-foot house insured with the same company. What is her monthly premium?

Solve the equation for the constant of proportionality and for the corresponding value of y .

7. If y is inversely proportional to x and $y = 120$ when $x = 6$, what is the value of y when $x = 3$?

8. The weight (M) of an object on Mars is directly proportional to its weight on Earth (E). An object weighs 100 kilograms on Mars and 40 kilograms on Earth. If a person weighs 96 kilograms on Mars, how much does the person weigh on Earth?

9. The cost of building a shed is directly proportional to the size of the shed. It costs \$25.00 per square foot to build a 100-square foot shed. What does it cost to build a 225-square foot shed?

Independent Practice (7.A.1.1)

Name _____

Solve the equation for the constant of proportionality and for the corresponding value of y.

10. If 4 farmworkers using 4 mowing machines can mow a 100-acre hayfield in 2 hours, how long will it take one farmworker with one mowing machine, moving at the same speed, to mow a 100-acre field?

Choose the best answer.

11. Which equation shows direct variation? Circle your answer.

$$y = \frac{51}{x}$$

OR

$$46x = y$$

12. Which equation shows inverse variation? Circle your answer.

$$y = \frac{7}{x}$$

OR

$$y = -34x$$

13. Which equation shows inverse variation? Circle your answer.

$$196 = xy$$

OR

$$x = \frac{y}{13}$$

Solve the equation for the constant of proportionality and write the direct or indirect variation equation.

14. In a direct variation, $y = 18$ when $x = 6$. Write a direct variation equation that shows the relationship between x and y .

15. In a direct variation, $y = -92$ when $x = 46$. Write a direct variation equation that shows the relationship between x and y .

Solve the equation for the constant of proportionality and write the direct or indirect variation equation.

16. y is directly proportional to x . If $y = 24$ when $x = -6$, find y when $x = -3$.

17. In an inverse proportion, $y = 4$ when $x = 6$. Write an inverse variation equation that shows the relationship between x and y .

Solve the equation for the constant of proportionality and for the corresponding value of y .

18. In an inverse proportion, $y = 2$ when $x = 9$. Write an inverse variation equation that shows the relationship between x and y .

19. If y varies inversely with x , and $y = 9$ when $x = -9$, find y when $x = -3$.

20. If y varies inversely with x and $y = -6$ when $x = 15$, find y when $x = 45$.

Simplify the following absolute value problems

1. $|34| = \underline{\hspace{2cm}}$

2. $|-99| = \underline{\hspace{2cm}}$

3. $-|22| = \underline{\hspace{2cm}}$

Estimate the quotient and calculate the exact answer.

4. $\frac{52}{3} \approx - =$

5. $\frac{68}{7} \approx - =$

6. $\frac{40}{11} \approx - =$

Solve for the following problems.

7. $28 - 6 \times 5^2 + (36 \div \frac{3}{4}) = \underline{\hspace{2cm}}$

8. $(\frac{6}{8} + \frac{5}{4}) \times 4 + 81 \div 3^2 = \underline{\hspace{2cm}}$

9. $9 - 5 \times 4^3 + 11 = \underline{\hspace{2cm}}$

Identify if the relationship of the two variables, x and y are proportional, directly or inversely, then solve the equation for the constant of proportionality and for the corresponding value of y .

10. y is directly proportional to x , and $y = 100$ when $x = 25$. What is the value of y when $x = 5$ and $x = 10$?

7.A.1.2 Recognize that the graph of a proportional relationship is a line through the origin and the coordinate $(1,r)$, where both r and the slope are the unit rate (constant of proportionality, k).

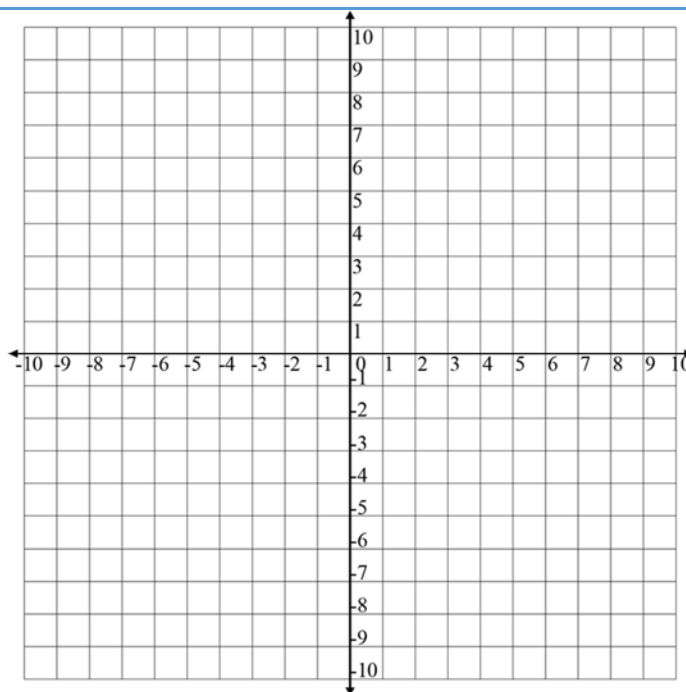
Real-World Connections

You are still looking at proportional relationships and unit rate, which is a comparison of two measurements in which one of the terms has a value of 1. You can use a graph to visualize the comparison. An example could be your cell phone company gives you a rate of \$15 plus \$0.20 per minute for call time. If you had 30 minutes of calls this month, what would the charges be? Your coordinate graph should show the proportion as a straight line through the origin.

Vocabulary

graph	a visual diagram used to represent statistical information or functions and equations
line	a line is a straight one-dimensional figure of infinite length
origin	the point of intersection of the x and y axis on a coordinate or Cartesian plane; the coordinates of the origin are $(0,0)$
coordinate	coordinates are written as ordered pairs of numbers or letters and numbers
slope	a measure of the steepness of a line in a Cartesian plane, found by the constant change in the y-coordinate per 1 unit change in the x-coordinate
unit rate	a comparison of two measurements in which one of the terms has value of one

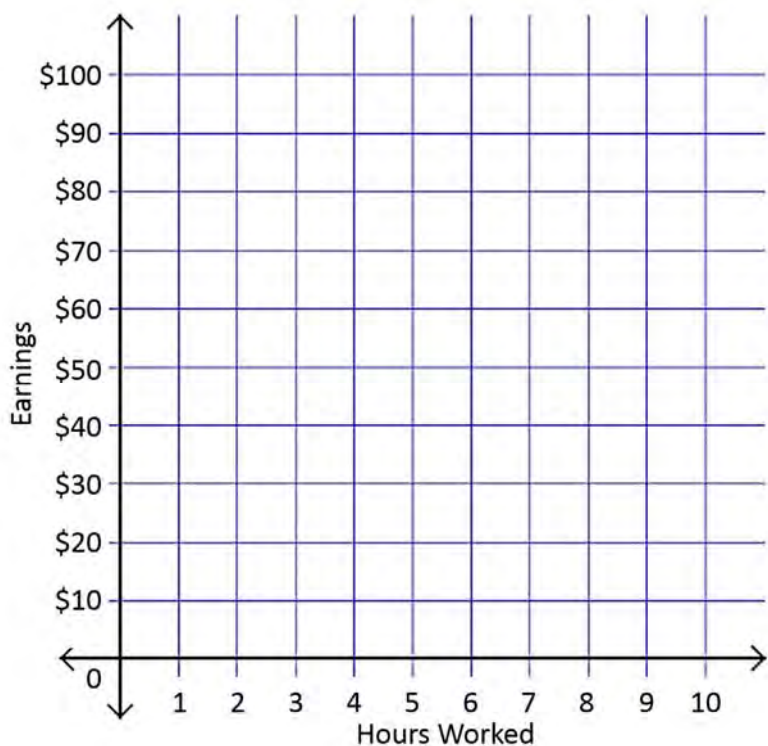
1. Identify the x -axis, the y -axis, origin, and quadrants.



For questions 2-3, plot the data onto the graphs.

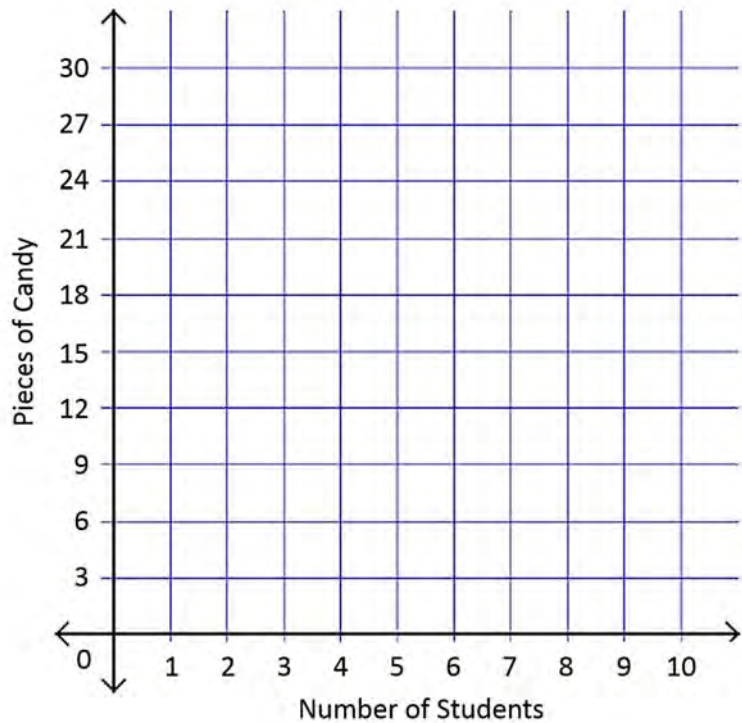
2.

x	y
Hours Worked	Earnings
1	\$10
5	\$50
7	\$70



3.

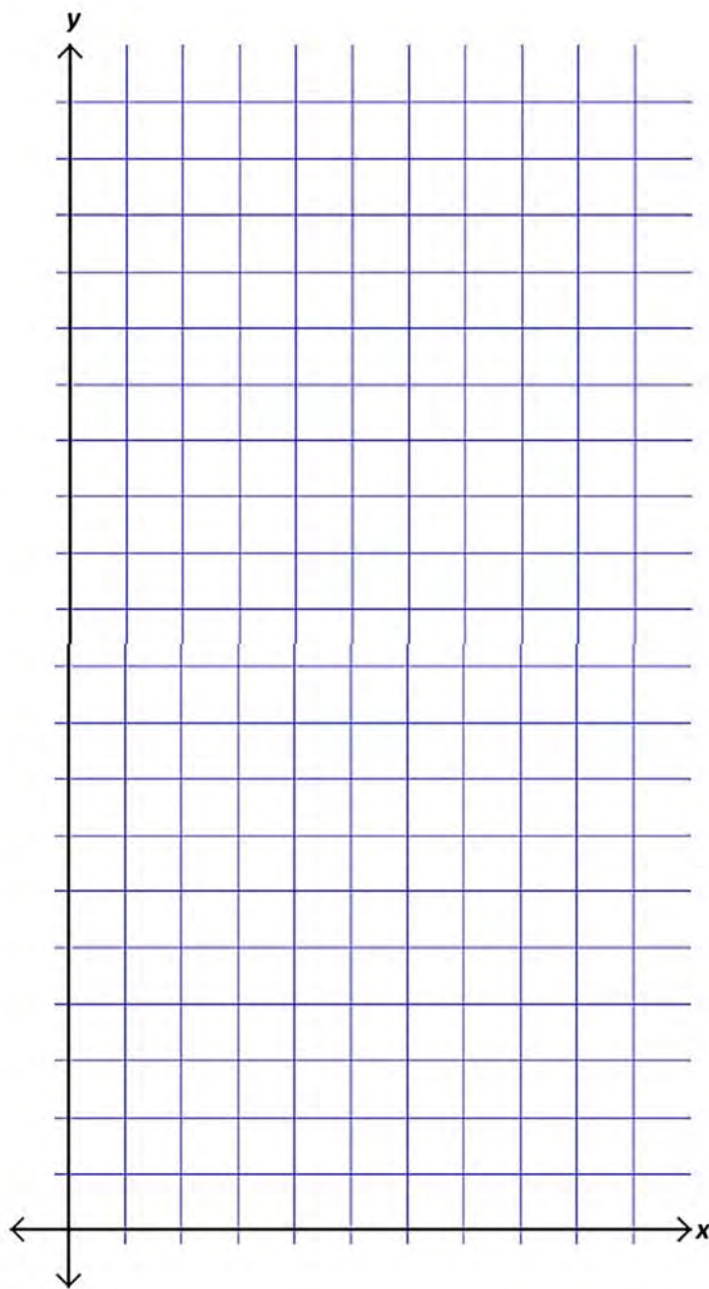
x	y
Number of Students	Pieces of Candy
3	9
6	18
9	27



For question 4, plot the data onto the graph and label it.

4.

x	y
Number of Students	Minutes on Art Project
3	6
6	12
9	18



Circle the best answer.

5. Which equation represents a proportional relationship?

A $y = 2x$

B $y = 7 - 2x$

C $y = 2x - 5$

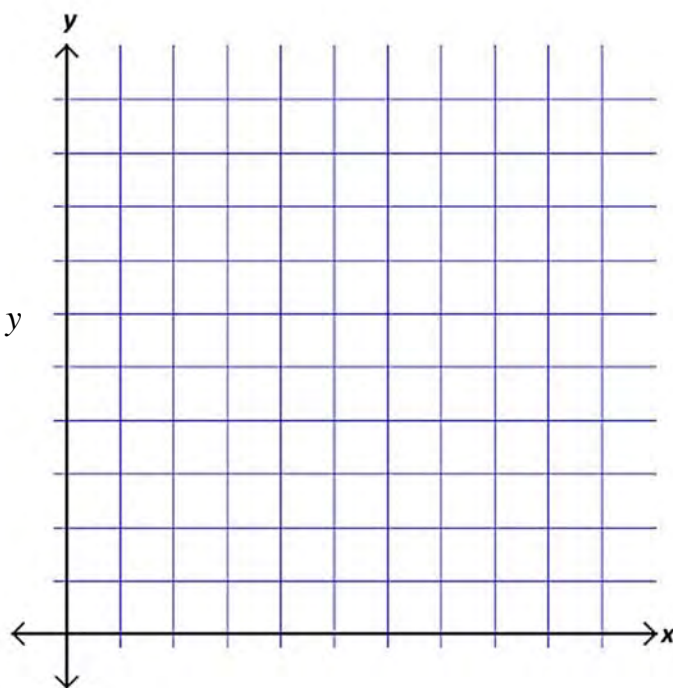
D $y = 2x + 7$

Graph the ordered pairs and answer the question that follows.

6. Graph the ordered pairs:

$(1, 5)$, $(2, 8)$, $(0, 2)$

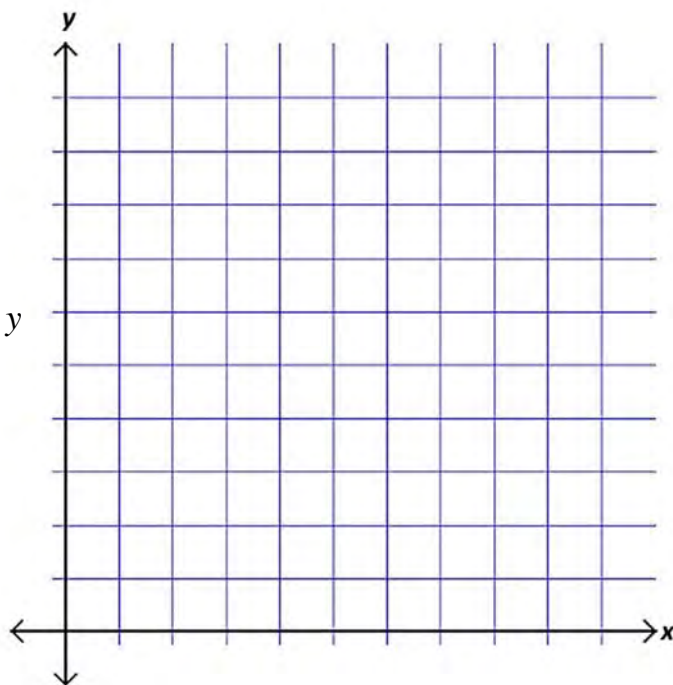
According to the graph, do x and y
have a proportional relationship?



7. Graph the ordered pairs:

$(2, 4)$, $(5, 10)$, $(1, 2)$

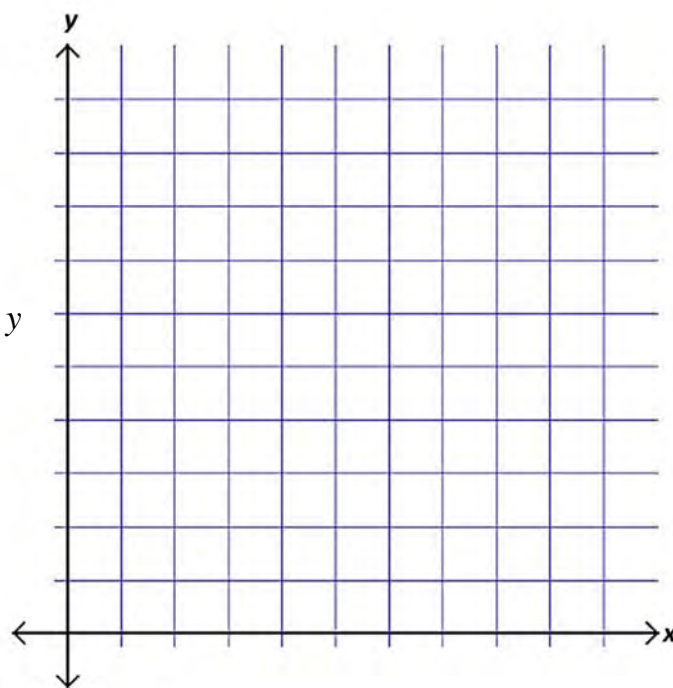
According to the graph, do x and y
have a proportional relationship?



Graph the ordered pairs and answer the question that follows.

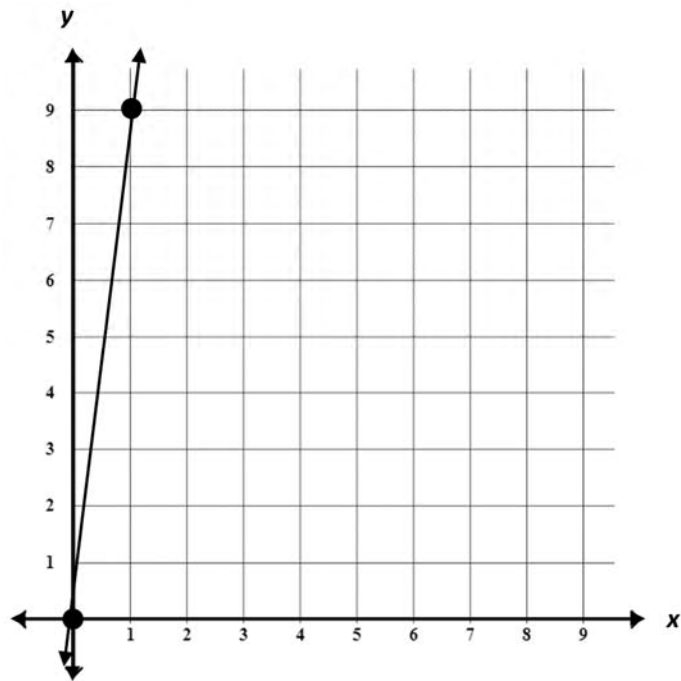
8. Graph the ordered pairs:
 $(12, 20)$, $(16, 40)$, $(10, 10)$

According to the graph, do x and y
 have a proportional relationship?

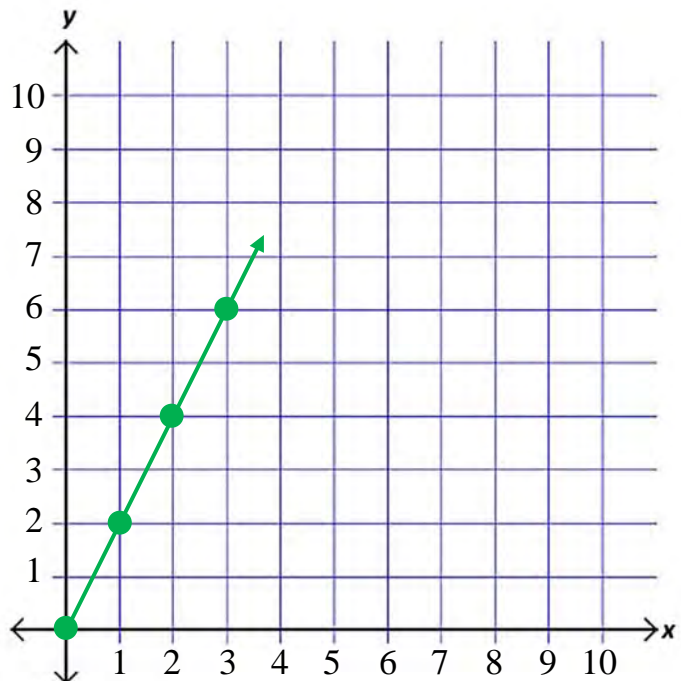


The graphs below show proportional relationships. Identify the constant of proportionality and record as requested.

9. The graph below shows a proportional relationship. Write an equation for the relationship between x and y .



10. The graph below shows a proportional relationship. What is the constant of the proportionality?

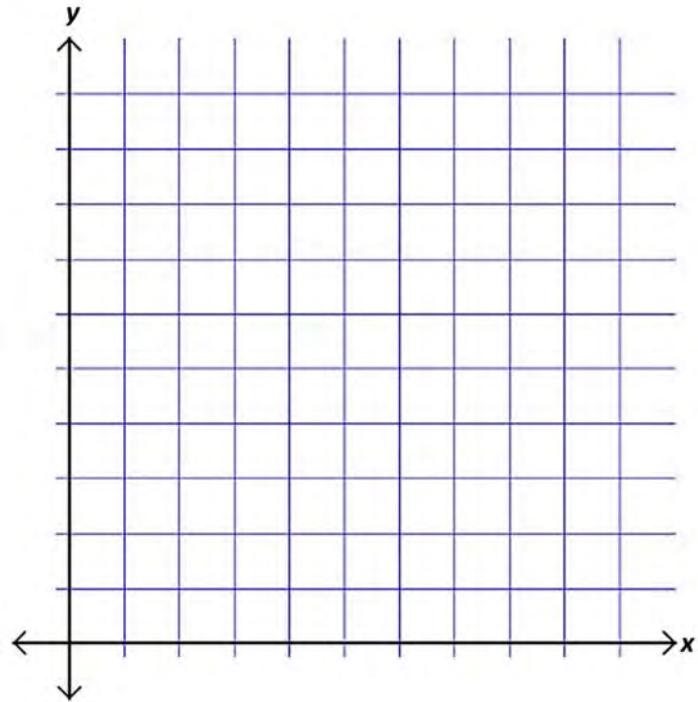


7.A.1.2 Recognize that the graph of a proportional relationship is a line through the origin and the coordinate $(1,r)$, where both r and the slope are the unit rate (constant of proportionality, k).

Complete the table and graph, and identify the proportional relationship in each.

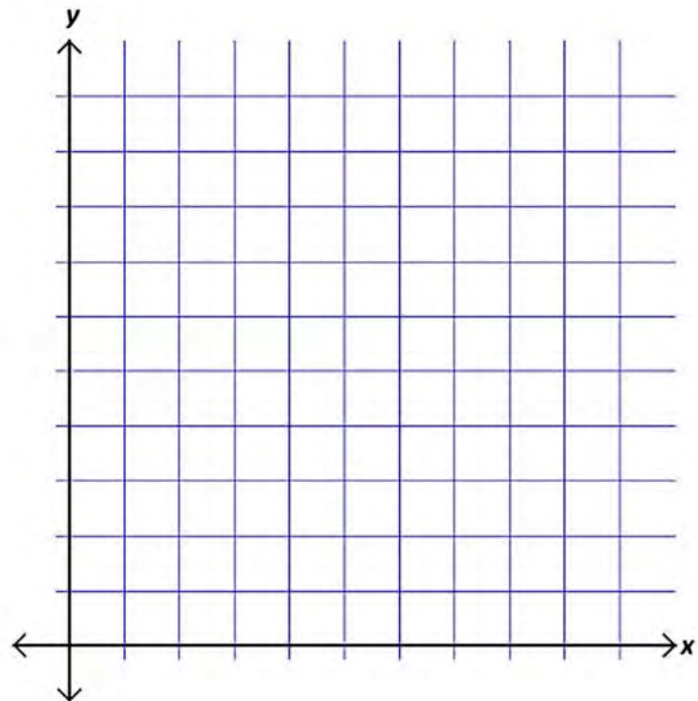
1. _____

x	y
2	15
3	10
5	
6	



2. _____

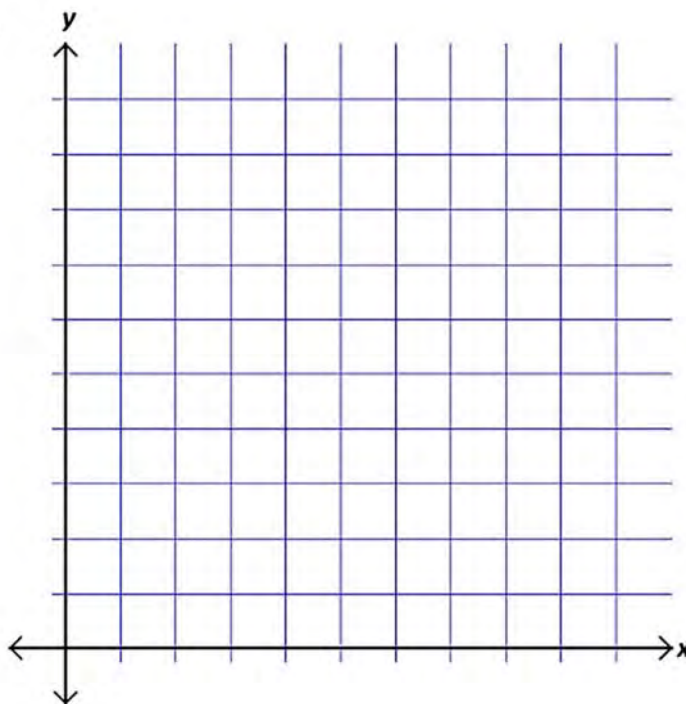
x	y
10	5
12	6
	7
16	



Complete the table and graph, and identify the proportional relationship in each.

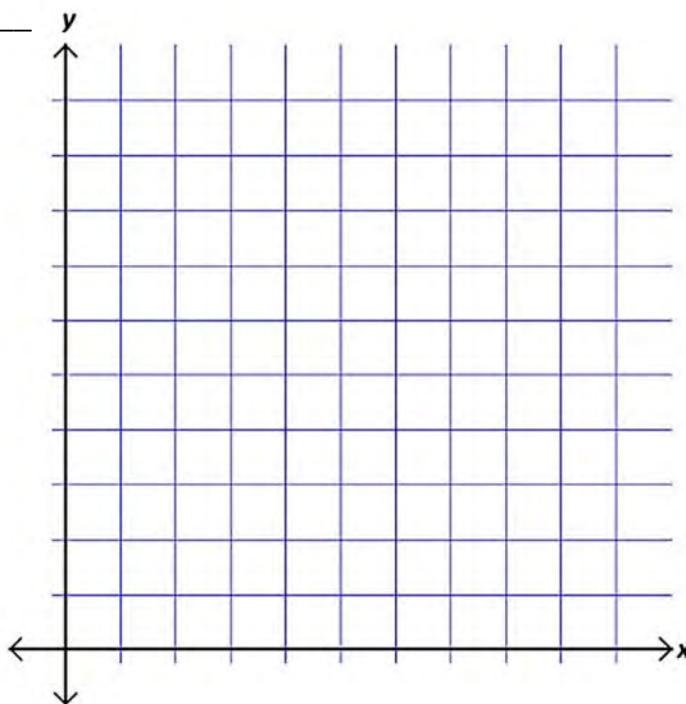
3. _____

x	y
8	16
9	18
10	20
11	22



4. _____

x	y
2	30
3	20
5	
	10

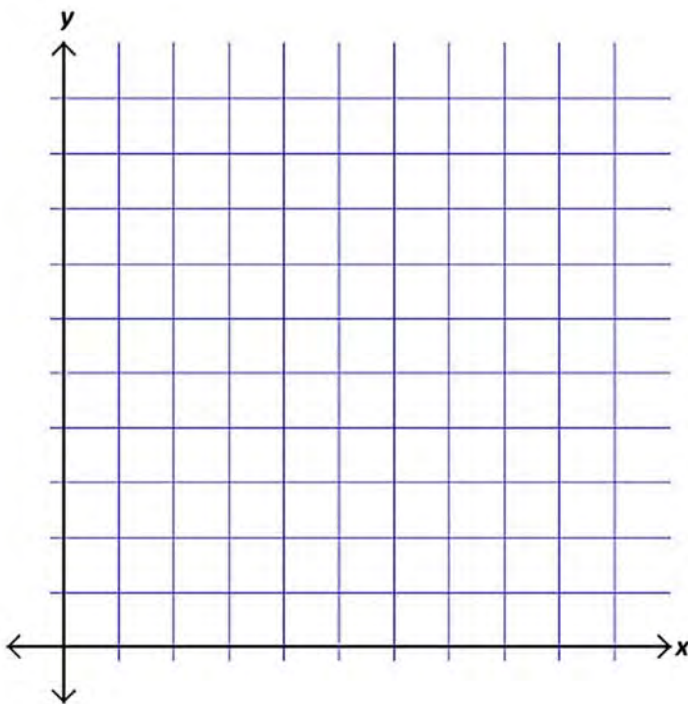


Complete the table and graph to create a directly or inversely proportional graph.

5. _____

Inversely Proportional

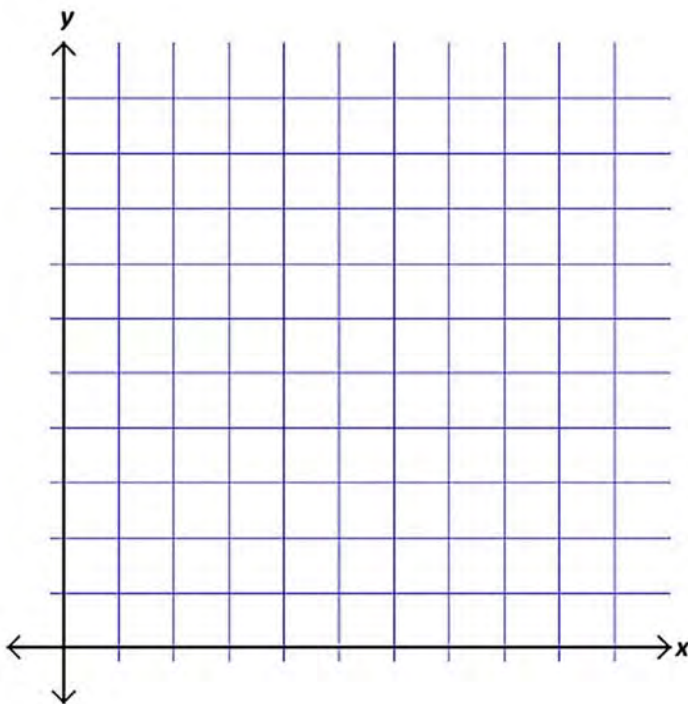
x	y
2	6
4	
6	
12	



6. _____

Directly Proportional

x	y
2	4
4	
6	
8	

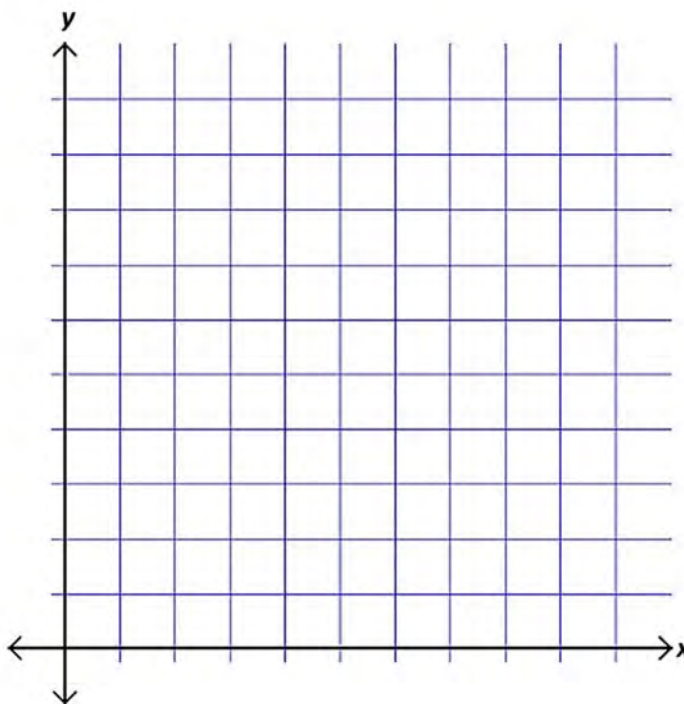


Complete the table and graph to create a directly or inversely proportional graph.

7. _____

Inversely Proportional

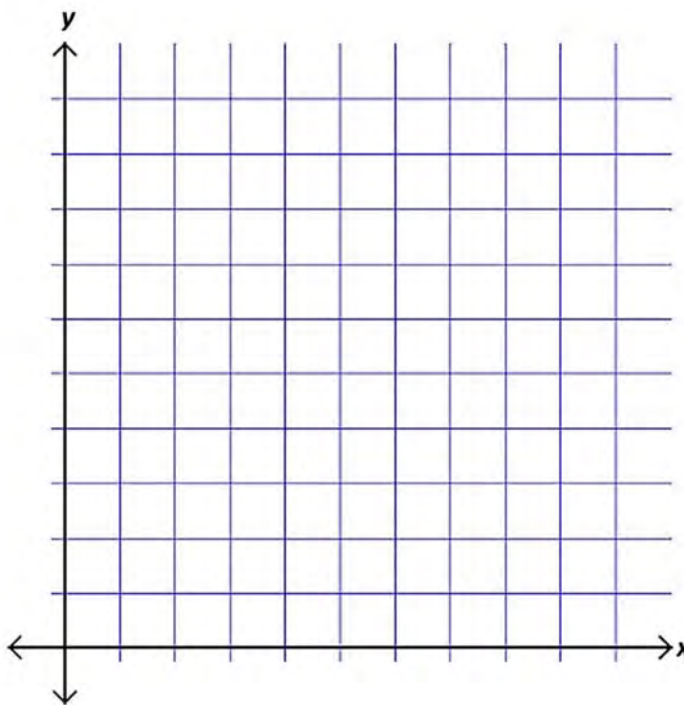
x	y
2	20
4	
5	
10	



8. _____

Directly Proportional

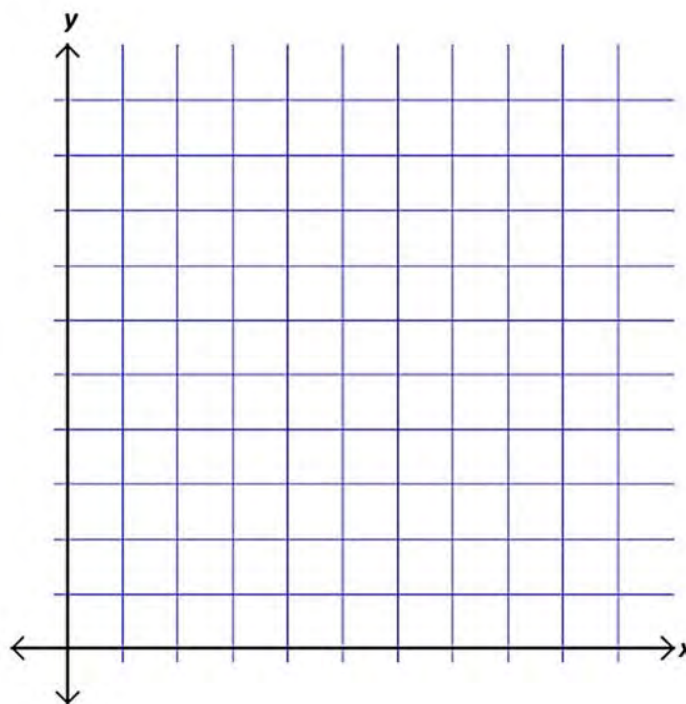
x	y
1	3
2	
3	
4	



Complete the table and graph, and identify the graph as directly or inversely proportional.

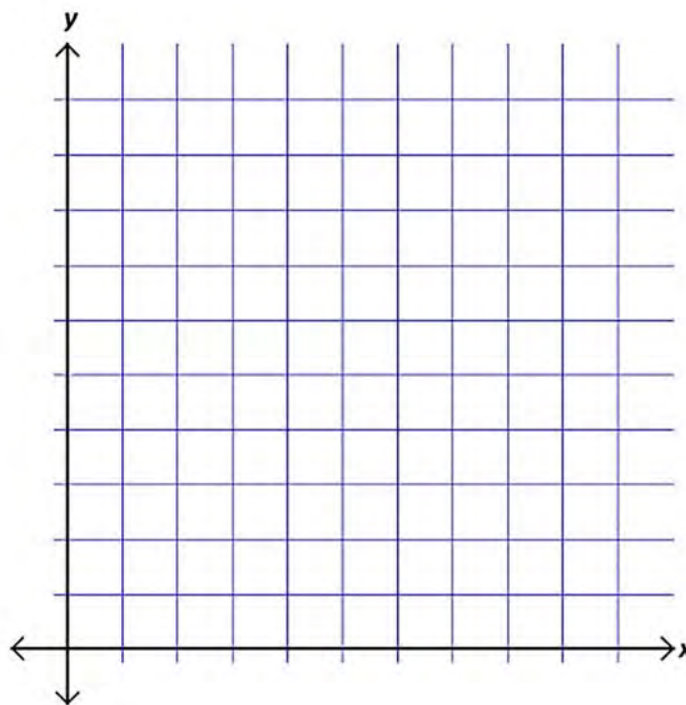
9. _____

x	y
1	
2	10
4	5



10. _____

x	y
1	4
3	12
5	
7	



Circle the best answer.

11. Which equation represents a proportional relationship?

A $y = -4x + 3$

B $y = \frac{1}{2}x - 1$

C $y = -8x$

D $y = 3x + 10$

12. Which equation does not represent a proportional relationship?

A $y = x$

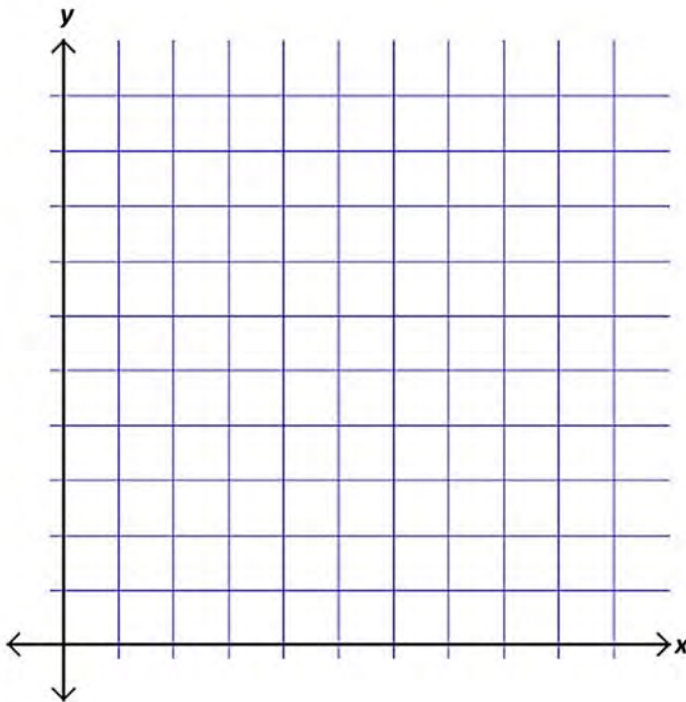
B $y = \frac{1}{2}x$

C $y = \frac{2}{5}x$

D $y = x - 7$

Graph the ordered pairs, then answer the question that follows.

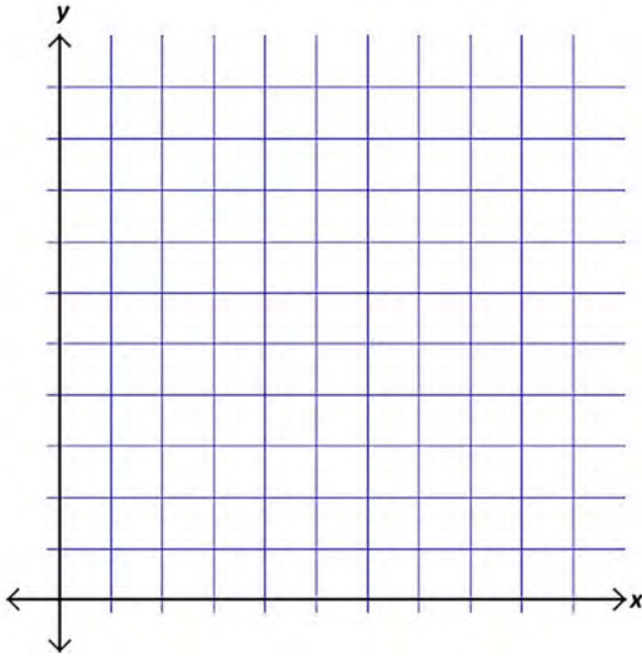
13. Graph the following ordered pairs. $(2, 2)$, $(5, 5)$, $(7, 7)$



According to the graph,
do x and y have a proportional
relationship? _____

Graph the ordered pairs and answer the question that follows.

14. Graph the following ordered pairs. $(5, 7)$, $(10, 9)$, $(0, 5)$

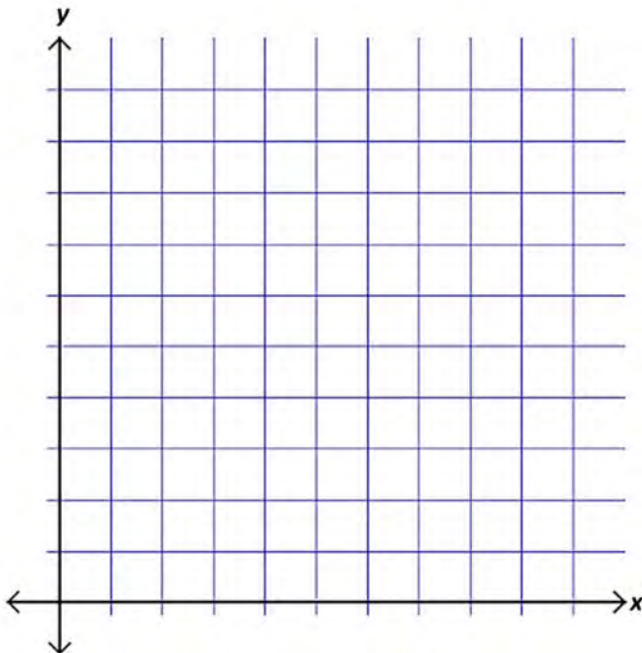


According to the graph,
do x and y have a proportional
relationship? _____

15. Ty builds wooden swings to sell for vacation spending money. It takes Ty five days to build four swings. It takes him ten days to build eight swings.

x = number of days y = number of swings made

Write and graph two ordered pairs. Connect the points to make a line.

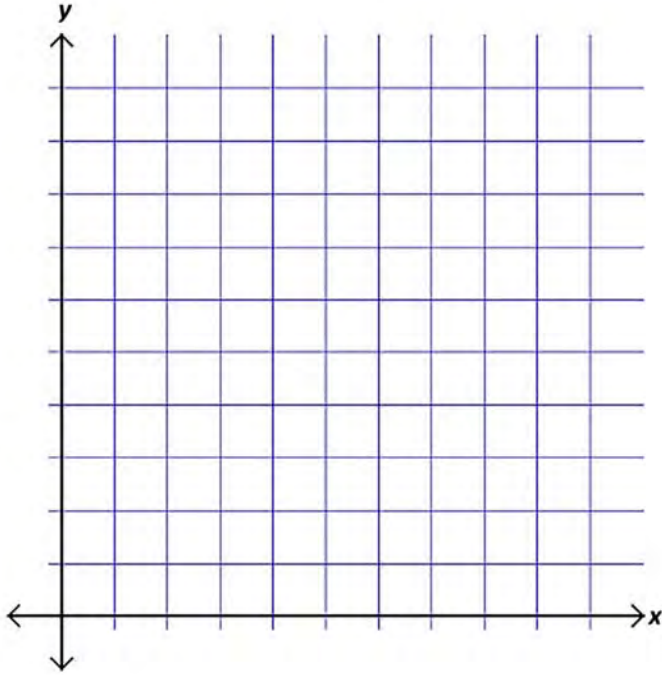


According to the graph,
do x and y have a proportional
relationship? _____

Graph the ordered pairs and answer the question that follows.

16. Tegan got a ferret for her 13th birthday. When the ferret was one-month old, he was 6 inches long. At 11 months old, the ferret is 20 inches in length. Let x represent the ferret's age in months and y represent the ferret's length in inches.

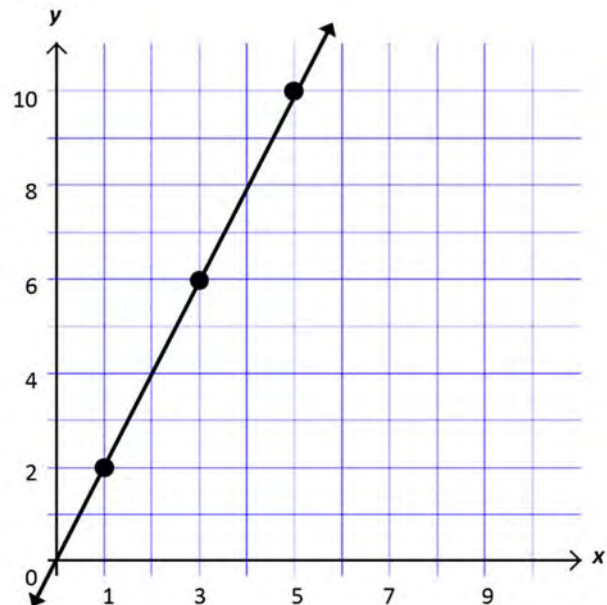
Graph 2 points for this relationship and the line passing through them.



According to the graph,
do x and y have a proportional
relationship? _____

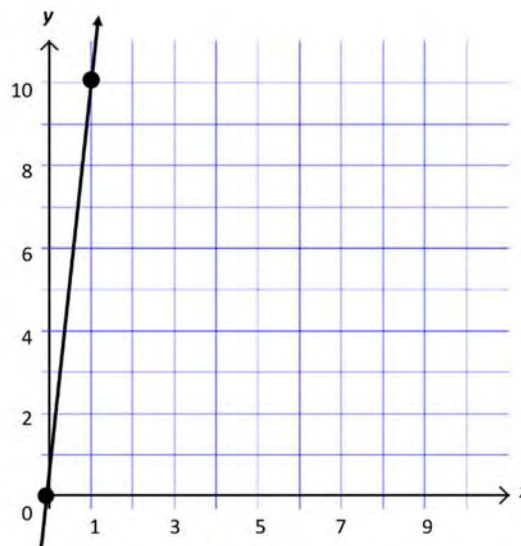
Solve.

17. The graph below shows a proportional relationship. What is the constant of proportionality?

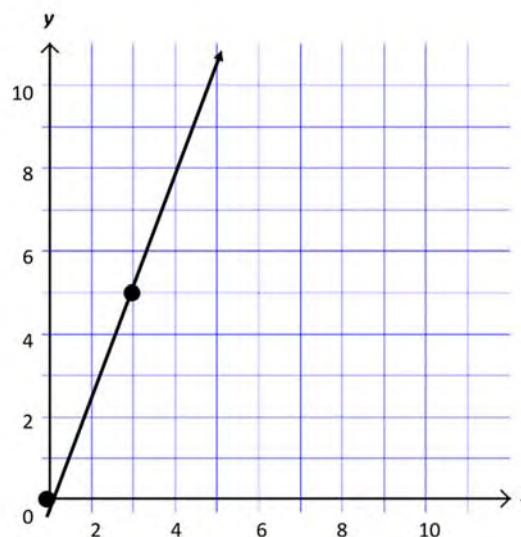


Solve.

18. The graph below shows a proportional relationship. What is the constant of proportionality?

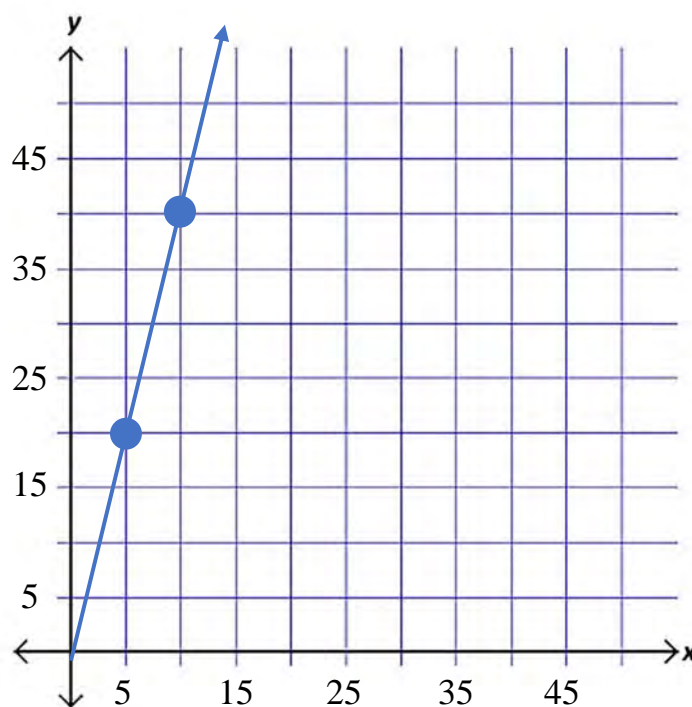


19. The graph below shows a proportional relationship. Write an equation for the relationship between x and y .



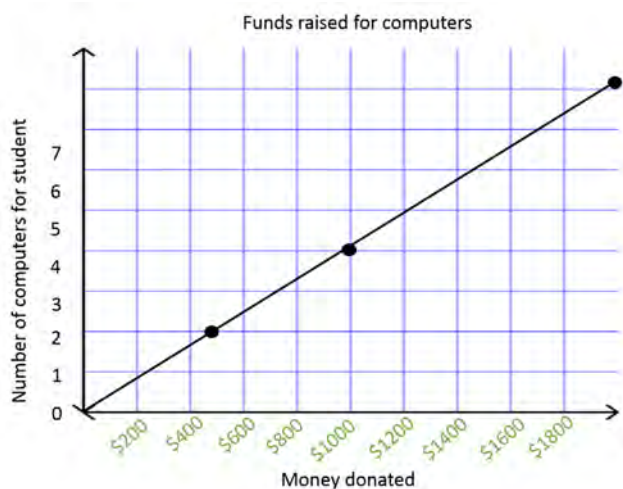
Solve.

20. The graph below shows a proportional relationship. Write an equation for the relationship between x and y .

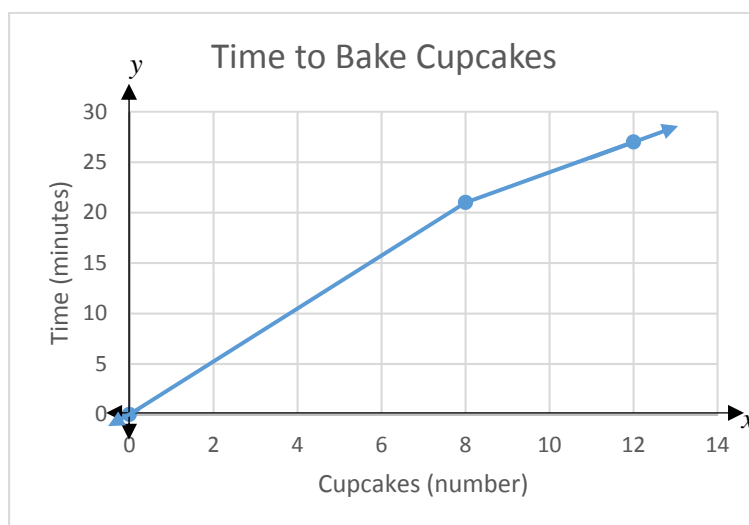


Label each graph direct or inversely proportional. Explain why.

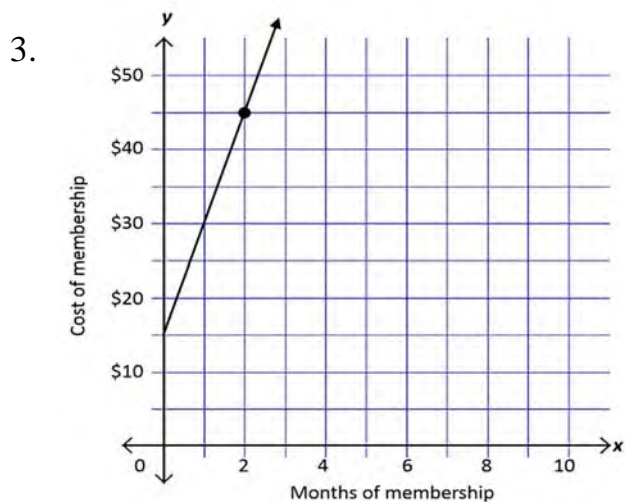
1.



2.



Label each graph direct or inversely proportional. Explain why.



Simplify the following absolute value problems.

4. $|45| + |6| =$ _____

5. $-|10| + |10| =$ _____

Write each expression in exponential form.

6. $10 \times 10 \times 10$ _____

7. 1×1 _____

8. 7×7 _____

9. $3 \times 3 \times 3$ _____

10. $5 \times 5 \times 5$ _____

7.A.2.1 Represent proportional relationships with tables, verbal descriptions, symbols, and graphs; translate from one representation to another. Determine and compare the unit rate (constant of proportionality, slope, or rate of change) given any of the representations.

Real-World Connections

In the real world, there are many proportional relationships. The phrases “movie tickets cost \$5.00 a piece,” or “he ran 3 miles per hour,” are examples of proportional relationships. Today, you will create a table and a graph to describe the verbal description of a proportional relationship. In addition, you will compare the unit rate when given any of these representations.

Vocabulary

tables	mathematical information organized in columns and rows
symbols	symbols and signs are commonly used to represent values, operations, grouping and mathematical terms
constant of proportionality	given a proportional relationship expressed as $y = kx$, the number k is often called the constant of proportionality

Guided Practice (7.A.2.1)

Name _____

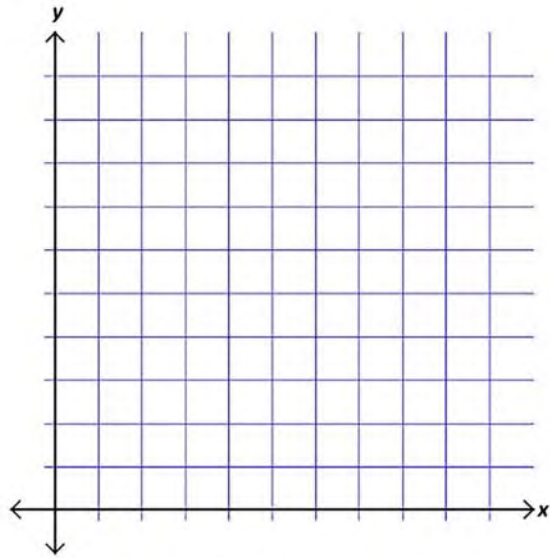
For each of the following relationships, create a table to show how these two quantities relate, graph them on the coordinate grid, and describe the unit rate or slope.

1. Gas costs \$2.05 per gallon

Gallons of Gas		1	2	3
Cost (\$)		2.05		

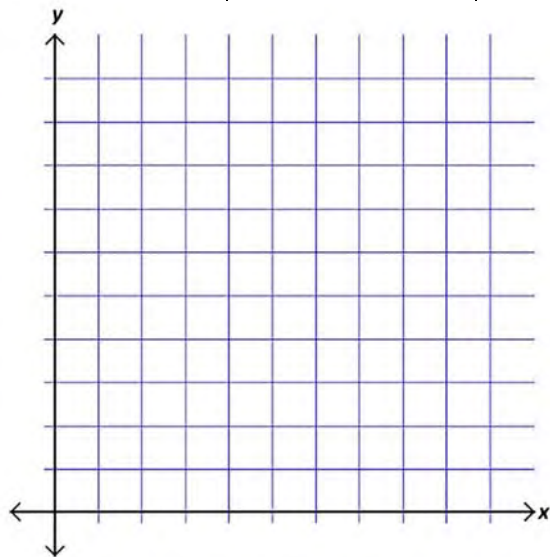
y-axis = cost

x-axis = gallons of gas



2. Evan hikes 14 miles in 4 hours at the Wichita Mountain Refuge

Hours	0	1		
Miles			7	



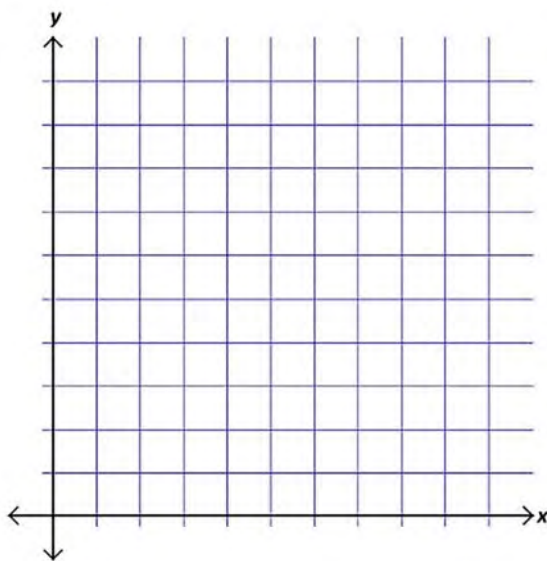
Guided Practice (7.A.2.1)

Name _____

For each of the following relationships, create a table to show how these two quantities relate, graph them on the coordinate grid, and describe the unit rate or slope.

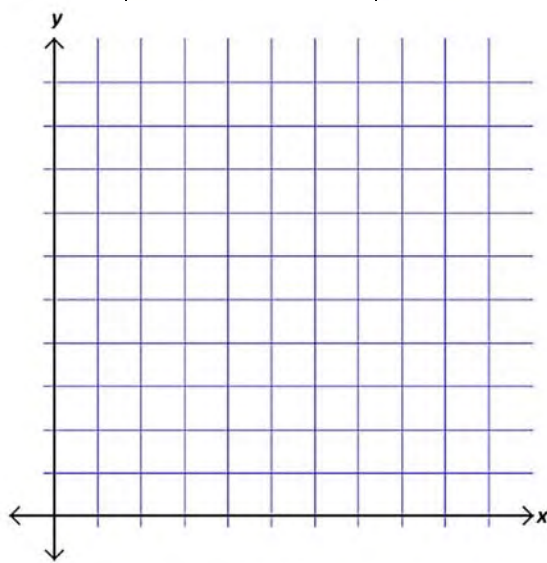
3. Barry rides his bike 81 miles in 9 hours with the Medicine Park Bike Club

x	0	1		9
y			27	



4. Bananas cost 0.50¢ per pound.

x	1	6	8	10
y	0.50¢			



Find the unit rate or rate of change.

5. Find the unit rate. 20 plants in 5 rows = plants per row.

6. Find the unit rate. 48 kilometers in 3 hours = kilometers per hour.

7. Keyshia made a table of the weights of the winning dog at recent dog shows.

WEIGHT OF WINNING DOG

YEAR	WEIGHT (LBS)
2017	22
2016	26
2015	29
2014	24
2013	26

According to the table, what was the rate of change between 2015 and 2017? _____

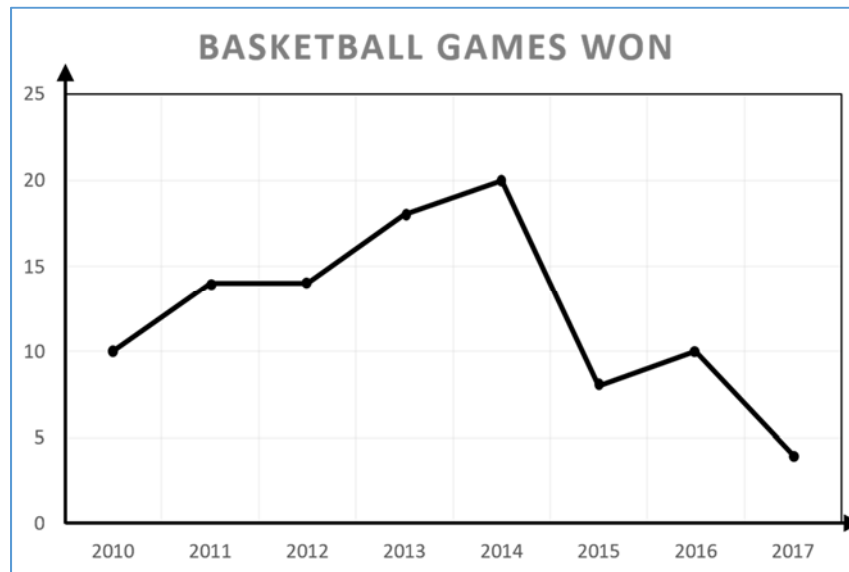
8. Drake kept track of how long it took to finish his homework each day.



According to the graph, what was the rate of change between Monday and Thursday?

Find the unit rate or rate of change.

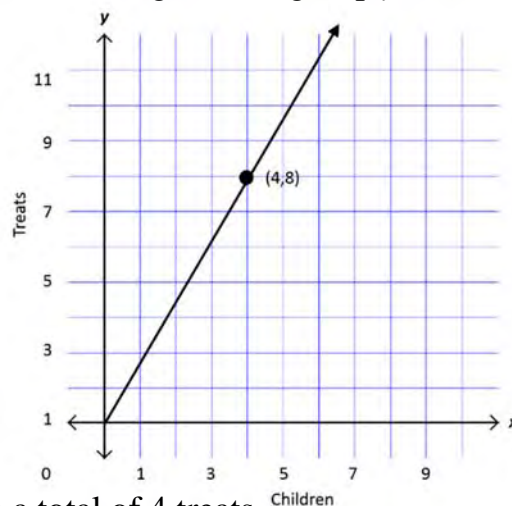
9. Two Tulsa Middle School basketball managers calculated the number of games won by their school each year.



According to the graph, what was the rate of change between 2014 and 2017?

Circle the best answer.

10. Every Halloween, trick-or-treaters go to Ivan's house for tasty treats. The graph shows the proportional relationship between the number of children in group x , and the total number of treats Ivan gives the group y .



What does the point (4,8) represent?

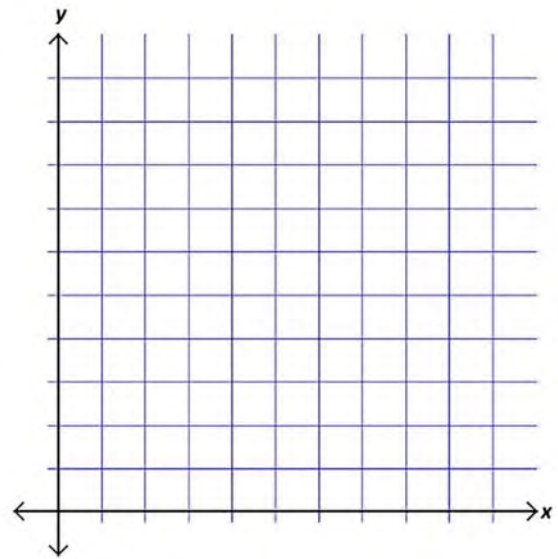
- A Ivan gives a group of 8 children a total of 4 treats
- B Ivan gives a group of 4 children a total of 12 treats
- C Ivan gives a group of 4 children a total of 8 treats
- D Ivan gives a group of 12 children a total of 12 treats

7.A.2.1 Represent proportional relationships with tables, verbal descriptions symbols, and graphs; translate from one representation to another. Determine and compare the unit rate (constant of proportionality, slope, or rate of change) given any the representations.

For each of the following relationships, create a table to show how the two quantities vary, graph them on the coordinate grid, and describe the unit rate or slope.

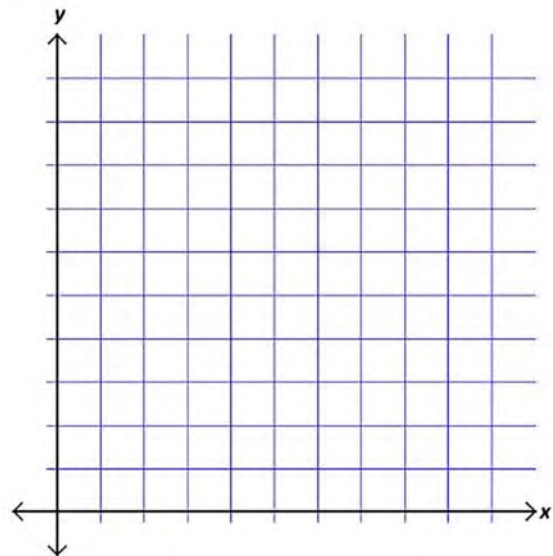
1. Tavi deposits \$300.00 a month into his savings account.

x	2	4	6	8
y				



2. Five chocolate bars cost \$3.00.

x	1	5		15
y		3.00	6.00	



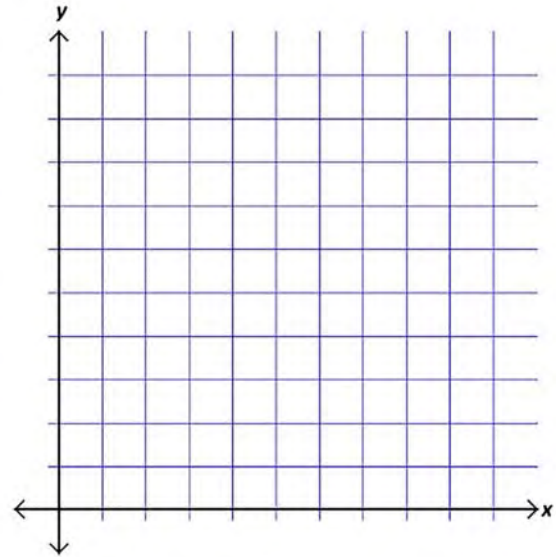
Independent Practice (7.A.2.1)

Name _____

For each of the following relationships, create a table to show how the two quantities vary, graph them on the coordinate grid, and describe the unit rate or slope.

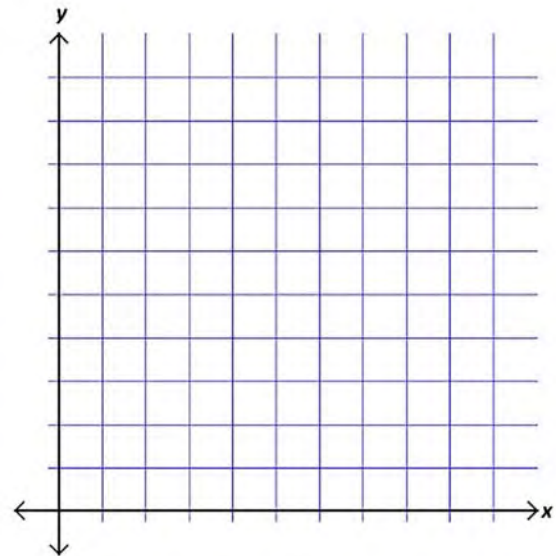
3. A school lunch costs \$2.50 each.

Lunch	1	2	4	10
Cost				



4. Grandma bakes 2 cakes an hour.

x	1	5	6	8
y	2			



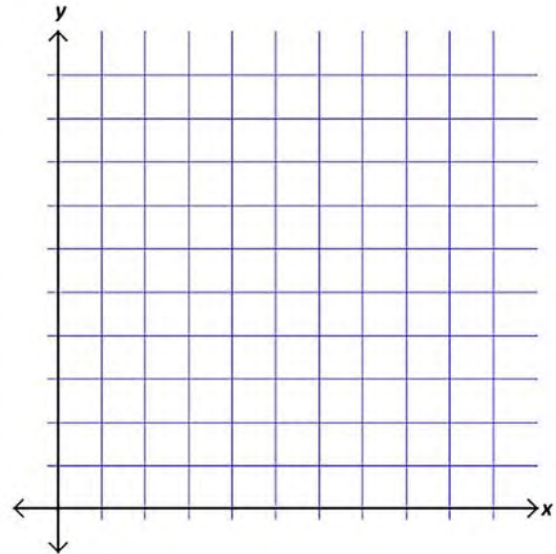
Independent Practice (7.A.2.1)

Name _____

For each of the following relationships, create a table to show how the two quantities vary, graph them on the coordinate grid, and describe the unit rate or slope.

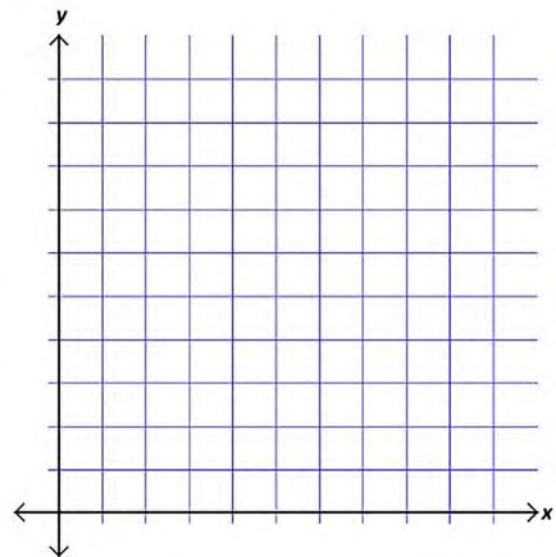
5. Jace's dad drives 605 miles in 11 hours.

x	1	5	6	8
y				



6. Ryan sends 8 text messages in 2 minutes.

x	1	2		
y		8	32	40

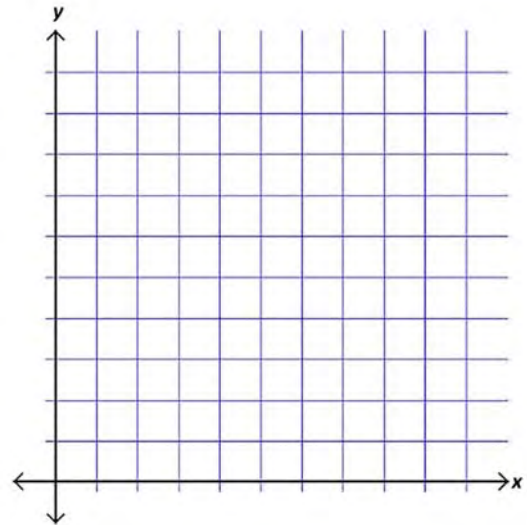
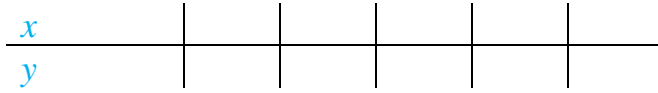


Independent Practice (7.A.2.1)

Name _____

For each of the following relationships, create a table to show how the two quantities vary, graph them on the coordinate grid, and describe the unit rate or slope.

7. Marcel reads 20 pages a day from his book.



Find the unit rate.

8. Find the unit rate. 58 kilometers in 2 hours = kilometers per hour

9. Find the unit rate. 96 liters in 6 minutes = liters per minute

Find the rate of change.

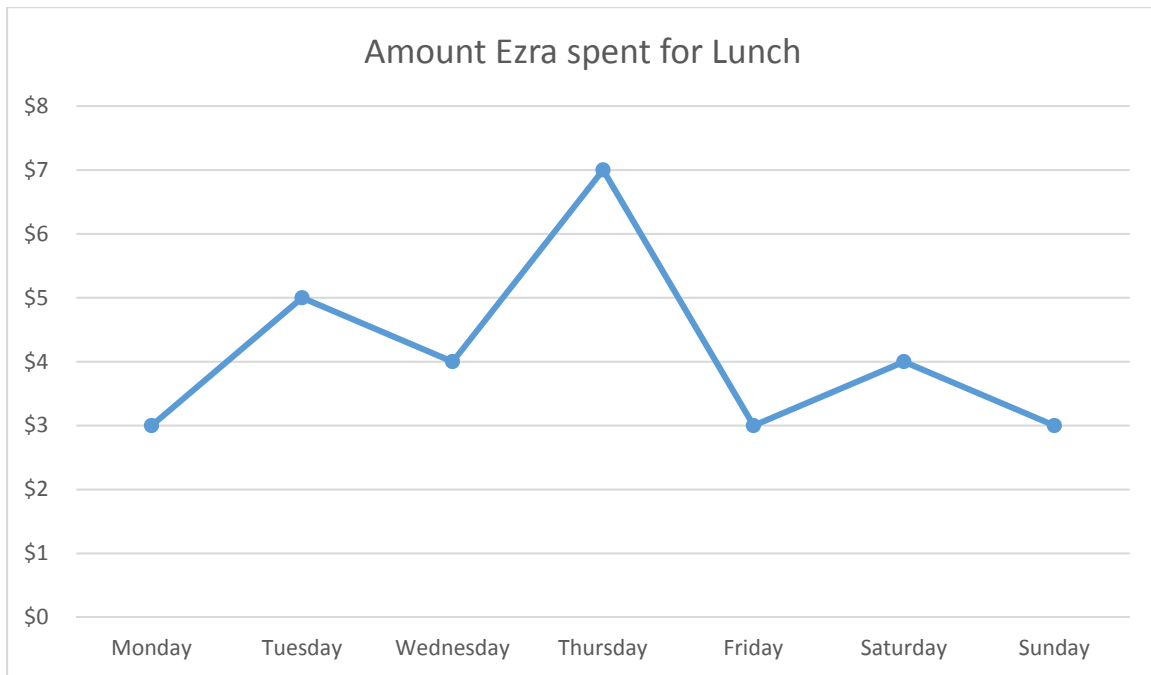
10. Miller told the 7th grade students how many rounds were in the spelling bee by making a table based on previous years.

ROUNDS IN THE SPELLING BEE

YEAR	NUMBER OF ROUNDS
2017	23
2016	27
2015	19
2014	24
2013	29

According to the table, what was the rate of change between 2014 and 2016?

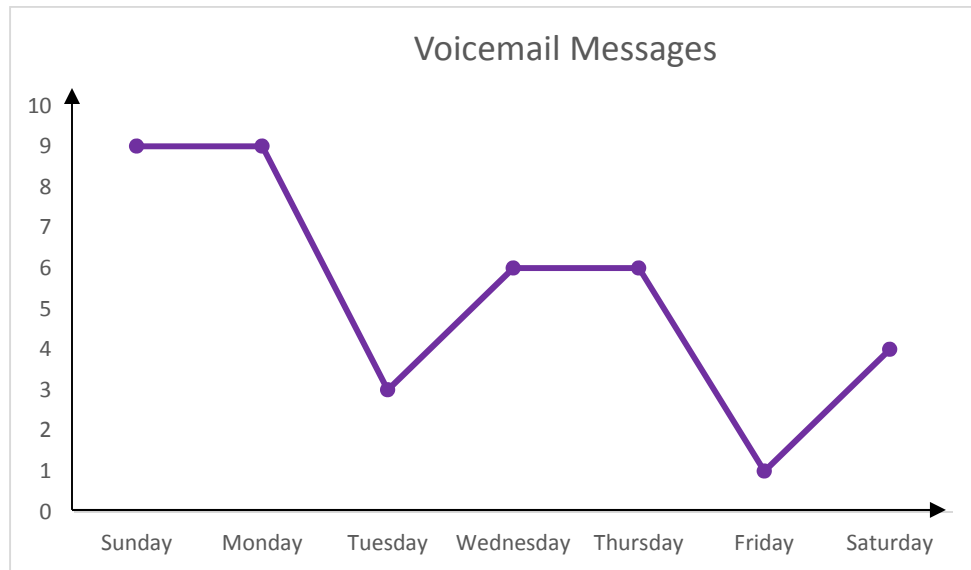
11. Ezra was trying to determine how much money he could save by packing his lunch. He recorded the amount he spent on lunch each day.



According to the graph, what was the rate of change between Monday and Saturday?

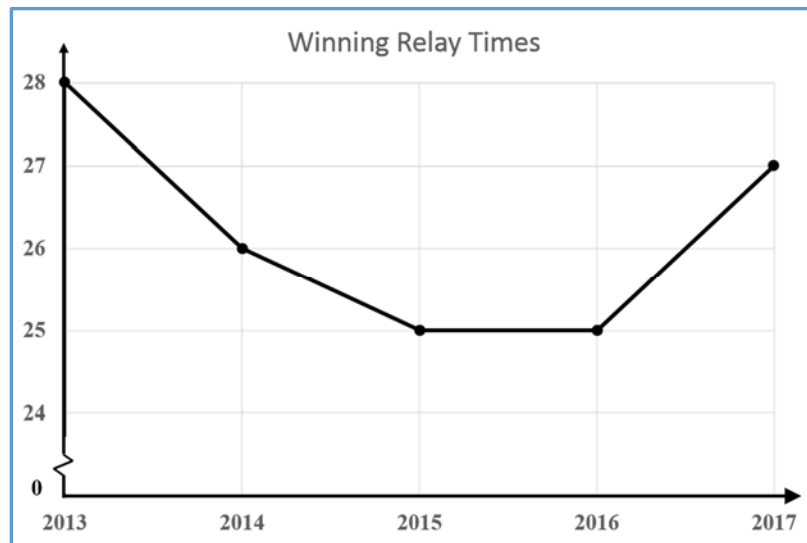
Find the unit rate or rate of change.

12. Diana monitored the number of undeleted voicemail messages stored in her phone each day.



According to the graph, what was the rate of change between Wednesday and Thursday?

13. Every year Lindsay, Oklahoma has a town-wide relay race and the local paper reports the winning times.



According to the graph, what was the rate of change between 2015 and 2017?

Find the unit rate or rate of change.

14. Fans of the OKC baseball team compared the number of games won by their team each year.

GAMES WON BY OKC

YEAR	GAMES WON
2013	12
2014	16
2015	19
2016	18
2017	4

According to the table, what was the rate of change between 2013 and 2017?

15. Mrs. Harris kept a record of the number of emails she received each day for a school week.

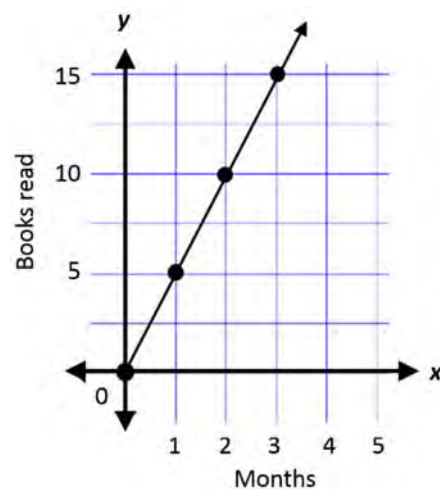
MRS. HARRIS'S EMAILS

DAY	EMAILS
Monday	7
Tuesday	7
Wednesday	13
Thursday	12
Friday	10

According to the table, what was the rate of change between Monday and Tuesday?

16. This graph shows how the total number of books Jayden has read depends on the number of months he has been a member of the book club.

According to the graph, what was the rate of change?



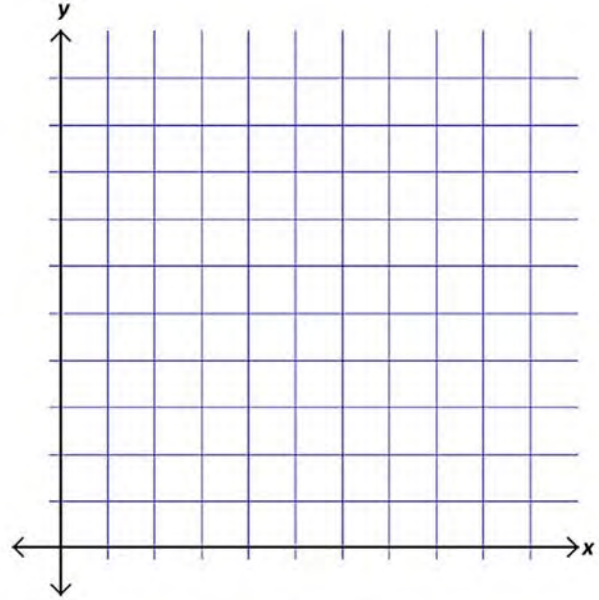
Independent Practice (7.A.2.1)

Name _____

For each of the following relationships, create a table to show how the two quantities vary, graph them on the coordinate grid, and describe the unit rate or slope.

17. Casandra squeezes 2 ounces of juice from each orange. Complete the function table and graph the ordered pairs.

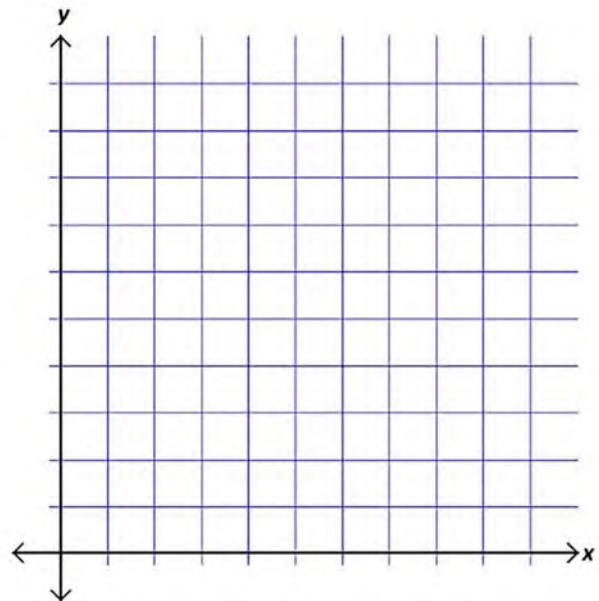
x	y
1	2
3	
	10



What is the rate of change?

18. Every weekend Steven and his dad go to the batting cages to practice hitting. Steven's dad buys tokens for him to use. Two tokens will buy him 10 pitches. Complete the function table and graph the ordered pairs.

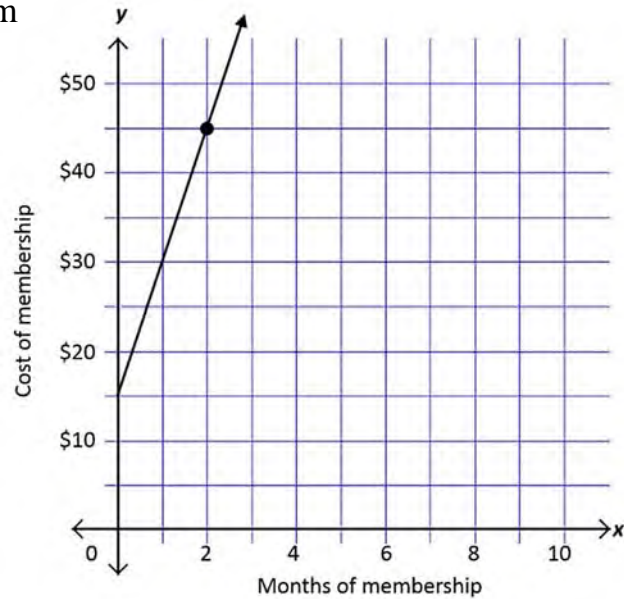
x	y
1	
2	
5	
10	



What is the constant of proportionality?

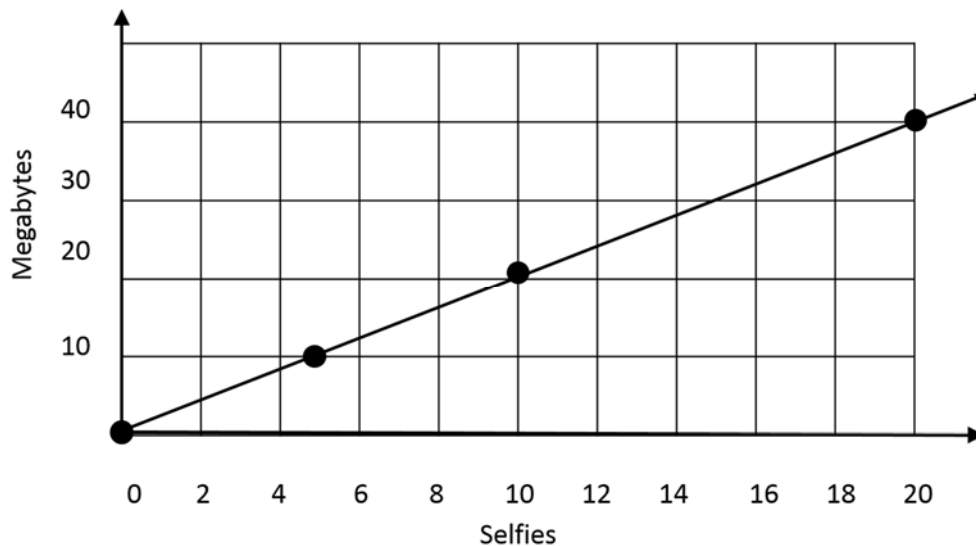
For each of the following relationships, determine if the graph shows a proportional relationship.

19. Isaiah joined a local gym. The gym charged a registration fee along with a monthly fee. This graph shows the relationship between the length of his membership (in months), x , and the total cost of his membership (in dollars), y .



Does the graph show a proportional relationship?
Explain why it does or does not.

20. Jessi uses her phone to take selfies. This graph shows the relationship between the number of selfies Jessi takes, x , and the amount of storage (in megabytes) she uses taking selfies, y .



Do x and y have a proportional relationship? Explain why or why not.

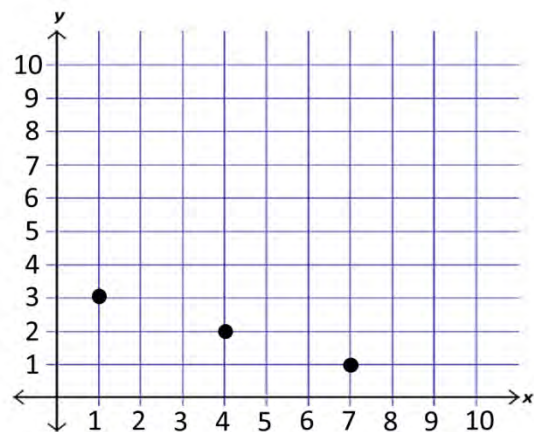
Solve.

1. Mr. Jenkins brought 6 boxes of donuts to school. Each box contained 12 donuts. There were 8 donuts not eaten. How many donuts were eaten?

Identify proportional and inversely proportional relationships in graphs.

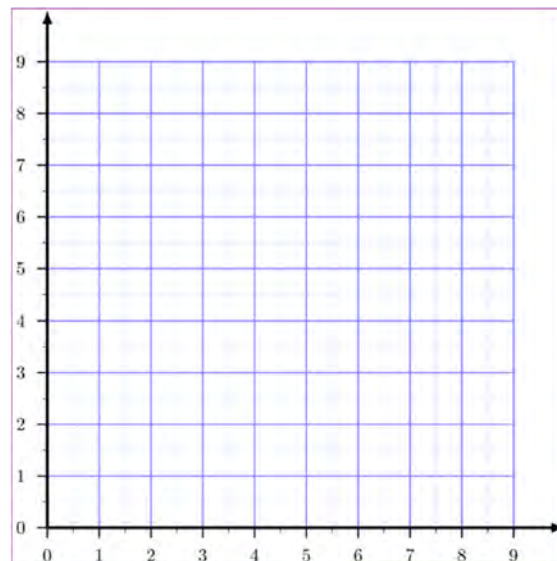
2. The table below gives the numbers of painters it takes to paint a house and the days it will take them to paint it. Graph the table. Does the graph display two quantities that are proportional to each other?

x	y
1	3
7	1
4	2



3. Given a proportional relationship complete the table and graph the coordinates.

x	y
4	2



Explain.

4. Compare the tables and graphs in number 2 and number 3. What makes one graph proportional and the other not proportional?
- _____

Identify if the relationship of the two variables, x and y are proportional, directly or inversely. Then solve the equation for the constant of proportionality and for the corresponding value of y .

5. y is inversely proportional to x , and $y = 44$ when $x = 11$.
What is the value of y when $x = 2$ and $x = 4$?
- _____

6. 3 people can paint a fence in 2 hours. How long will it take 6 people to paint it?
It is inversely proportional because as the number of people goes up, the painting time goes down and as the number of people goes down, the painting time goes up.
- _____

Simplify the following absolute value problems.

7. $|50| + |4| =$ _____

8. $-|10| + -|15| =$ _____

Which sign makes the statement true? $<$, $>$, or $=$

9. $|-4| \boxed{} - 4$

10. $10 \boxed{} |-10|$

7.A.2.2 Solve multi-step problems involving proportional relationships involving distance-time, percent increase or decrease, discounts, tips, unit pricing, similar figures, and other real world and mathematical situations.

Real-World Connections

Many real-world situations are multi-step in nature and problems involving proportional relationships are common. Determining how long it will take to get to a destination at a certain speed is a distance–time proportion. Shopping is another situation where there are several different proportional relationships including percent increase, decrease, discounts, and unit pricing.

Now, think about designing a house, car, or anything that is large. When you design, it needs to be small enough to fit on paper or a computer screen. You design with similar figures in mind. They are the same shape and the ratios of the lengths of their corresponding sides are equal. If you can identify a proportional relationship in a situation, you can create your own multi-step problem to calculate a solution.

Vocabulary

multi-step problems	one or more problems must be solved to get the information needed to solve the question being asked
distance-time	extent or amount of space between two things, points, lines, etc.; intervals
percent-increase	a measure of change, which is the extent to which something gains value
percent-decrease	a measure of change, which is the extent to which something loses value
discounts	a reduction in normal price
tips	a gift or a sum of money given for a service performed or anticipated gratuity
unit pricing	a unit price compares the price of something to a unit of measurement, for example, cost per kilogram or cost liter or gallon
similar figures	figures that have the same shape are said to be similar, the ratios of the lengths of their corresponding sides are equal

Given the following situations, solve problems involving multi-step proportional relationships.

1. You jog 2 hours at 4 mph. Distance = _____ miles. ($d = rt$)

2. You jog 15 miles at 6 mph. Time = _____ hours. ($d = rt$)

3. Denise loves shoes and a good deal. There is a one-day sale, and shoes are marked down. The red rack has shoes marked down 25%, and you get another 25% off at the register. The blue rack has shoes for 50% off at the register. All shoes are priced at \$39.95. Which is the better deal? Explain.

4. Seth bought a TV on sale for \$597. The original price was \$747. What was the percent decrease? ($\frac{\text{amount of decrease}}{\text{original price}}$)

5. Abby's average in math for the first quarter was 81. Her second quarter average was 97. What was the percent of increase in Abby's grade?

($\frac{\text{amount of increase}}{\text{original price}}$)

Given the following situations, solve problems involving multi-step proportional relationships.

6. Ten friends go with you to a local restaurant. When the ticket arrives, the bill is \$166.77 before tax. There is an 18% gratuity on parties of 10 or more plus an 8.25% tax. Calculate the total bill, and tell each friend how much they owe.

7. Which is the better deal on ketchup: one 30 ounce bottle for \$2.19, or two 20 ounce bottles for \$2.40? (unit rate has a denominator of one)

8. Convert 6 hours to seconds.

9. Convert 4 gallons to pints.

10. Sean is designing a house. The model house is to scale 1 inch = 2 feet. If the real house is 26 feet wide, how wide is the model?

7.A.2.2 Solve multi-step problems involving proportional relationships involving distance-time, percent increase or decrease, discounts, tips, unit pricing, similar figures, and other real world and mathematical situations.

Given the following situations, solve problems involving multi-step proportional relationships. Round to the nearest whole number.

1. If given a map that has a scale factor of 5 inches equals 29 miles, how far apart on the map are two cities that are 87 miles apart in distance.

2. Find the distance between Duncan and Lawton if they are 10 centimeters apart on the map with a scale of 4 centimeters equals 21 kilometers.

3. If you can buy two gift baskets for \$60, how many baskets can you buy with \$360?

4. Calculate a 30% discount on two pair of jeans that cost \$17.99 each.

5. There is a 25% discount on a 50-inch TV that sells for \$349. Sales tax is 4%. How much is the total cost after tax?

6. A 12-ounce bottle of shampoo lasts Lindsay 12 weeks. How long would you expect a 36-ounce bottle of the same brand to last her?

Given the following situations, solve problems involving multi-step proportional relationships. Round to the nearest whole number.

7. The waiting time to get on the wave rider at the water park is 22 minutes when 150 people are in line. How long is the waiting time when 240 people are in line?

8. Ryan's clothing store buys coats for \$45 and sells them for \$85. What is the percent of increase?

9. Louis is growing flowers for a science experiment. Flower A is 5 inches tall, and flower B is 15 inches tall. Both flowers grow for two weeks. At the next measurement both flowers are at 20 inches. What was the percent of growth for each flower?

10. Rachel weighed 197 pounds in December and 155 pounds in June. What was her percent of decrease in weight?

11. Hayden can wash four cars in 72 minutes. If Hayden works at the same rate, which formula shows how long it will take Hayden to wash three cars?

A $\frac{3}{72} = \frac{4}{x} = 96$

B $\frac{3}{72} = \frac{x}{4} = \frac{1}{6}$

C $\frac{72}{4} = \frac{3}{x} = \frac{1}{6}$

D $\frac{72}{4} = \frac{x}{3} = 54$

12. A skateboard ramp's ratio of length to height is 72 to 48 inches. If a similar ramp is made with a 36-inch height, how long will it be?

Given the following situations, solve problems involving multi-step proportional relationships. Round to the nearest whole number.

13. The cost of Kara and Dwayne's dinner was \$29.65. They want to leave a 20% tip. If they pay with a \$50 bill, how much change would they receive?

A \$14.42
B \$23.72
C \$29.65
D \$35.58

14. Carter attempted 30 basketball shots. He scored on 21 of them. Write a ratio and solve for x to find the number of shots Carter would score out of 200.

15. What is the percent of change from 400,000 to 500,000?

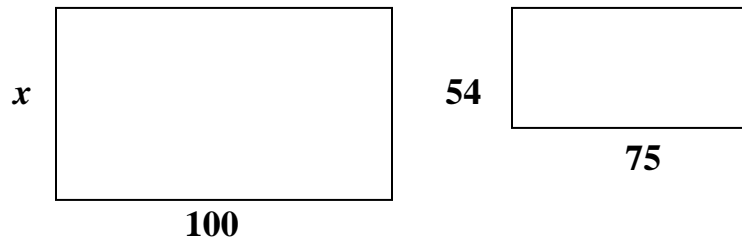
A 26% decrease
B 26% increase
C 25% decrease
D 25% increase

16. Julia had a \$25 pizza delivery. A coupon cut the price by 15%. The sales tax was 9%. In all, how much was the pizza?

17. Mr. Herrin earns \$1,908.00 every two weeks. He received a 4% pay increase. How much more will he earn every two weeks?

Given the following situations, solve problems involving multi-step proportional relationships. Round to the nearest whole number.

18. These two rectangular tables are similar and measured in inches.



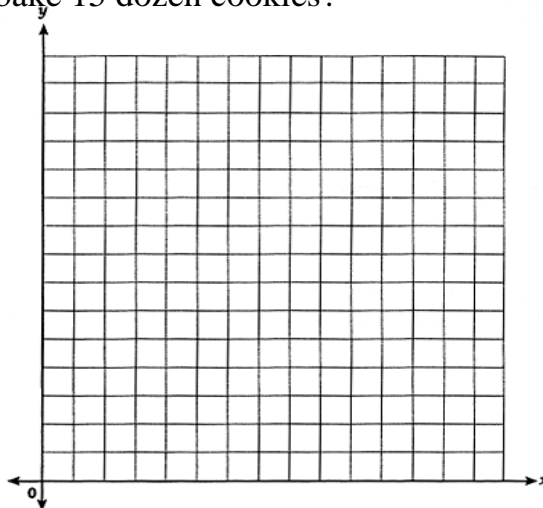
What is the length of side x ?

- A 139 inches
 - B 72 inches
 - C 41 inches
 - D 39 inches
19. Roxi receives money from her relatives every year on her birthday. Last year, she received \$64.00. This year, she received 25% more than last year. How much birthday money did Roxi receive this year?

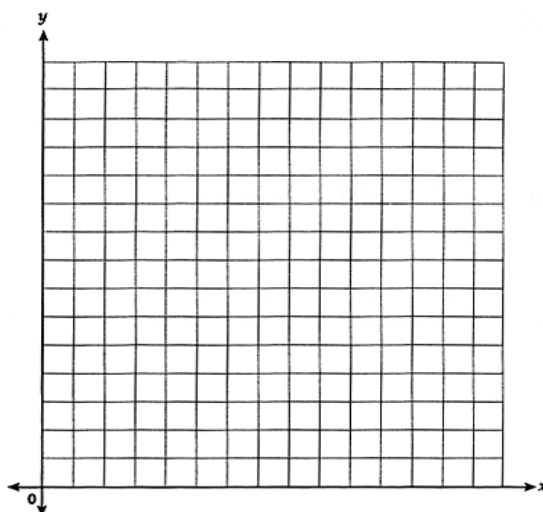
20. Garrett planted sunflowers in his grandmother's garden. During his last visit, the plants were 70 inches tall. Today, they are 84 inches tall. What is the percent of increase in the height of the sunflowers?

For each of the following relationships, create a table to show how the two quantities relate, graph them on the coordinate grid, and describe the unit rate or slope.

1. Aunt Diane uses 3 cups of chocolate chips to bake 6 dozen cookies. How many cups of chocolate chips would she need to bake 15 dozen cookies?



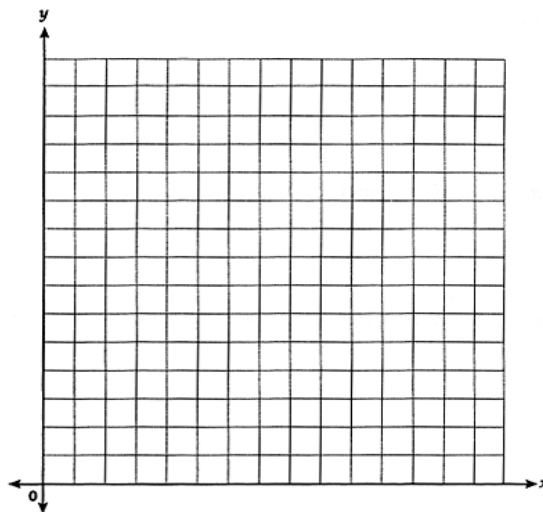
2. The electronic grading machine at John Adams Elementary can grade 52 multiple choice tests in 1 minute. How long will it take to grade 338 tests?



For each of the following relationships, create a table to show how the two quantities relate, graph them on the coordinate grid, and describe the unit rate or slope.

3. Randy stamps and addresses 360 envelopes in 2 hours.

x	1	2	4	6
y		360		



Compare using $<$, $>$, or $=$.

4. $9^3 \square 3^3$

5. $(-7)^2 \square 3^2$

6. $8^\circ\text{F} \square 10^\circ\text{F}$

Simplify the following absolute value problems.

7. $|5| + |63| =$ _____

8. $|98| - |42| =$ _____

Given the following situations, solve problems involving multi-step proportional relationships.

9. About 26 out of 40 students have computers at home. In a school of 1,800 students, how many students would you expect to have computers?

10. On a scale drawing, a plane is 2.2 feet long. The scale factor is $\frac{1}{9}$. Find the length of the plane.

7.A.2.3 Use proportional reasoning to solve real world and mathematical problems involving ratios.**Real-World Connections**

When you make a comparison, you are using proportional reasoning. Deciding whether to buy one jacket over another depends on comparison of the cost and the quality of each. You make comparisons when reading a map. If 1 inch on the map is equal to 100 miles, you can use the scale to determine the exact number of miles from one point to another. Real-world proportional reasoning is being able to make comparisons between things using multiplication. Today, you will use proportional reasoning to calculate real-world and mathematical problems involving ratios.

Vocabulary

proportional reasoning	the relationship between the two things are understood as a multiplicative relationship
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Answer the following ratio and proportional questions. Solve for x.

1. $\frac{5}{7} = \frac{60}{x}$ $x = \underline{\hspace{2cm}}$

2. $\frac{75}{100} = \frac{x}{4}$ $x = \underline{\hspace{2cm}}$

3. $\frac{9}{6} = \frac{x}{4}$ $x = \underline{\hspace{2cm}}$

4. $\frac{x}{12} = \frac{81}{108}$ $x = \underline{\hspace{2cm}}$

5. If 3 people can walk 9 dogs, how many people are needed to walk 18 dogs?

Answer the following ratio and proportional questions.

6. At Lake High School, 51 out of 352 seniors graduated with honors; 29 are girls and 22 are boys. Express each ratio three ways.

- A What is the ratio of boys to girls with honors?
- B What is the ratio of the total students to girls with honors?
- C What is the ratio of boys with honors to the total students?
- D What is the ratio of the total number of students with honors to the total number of students?

7. There are 56 students in the Science Club. Of those students, 32 are boys. Which proportion below can be used to find g , the percent of girl students in the club?

A $\frac{g}{100} = \frac{56}{24} = 233\%$

B $\frac{g}{100} = \frac{24}{56} = 43\%$

C $\frac{g}{100} = \frac{56}{32} = 175\%$

D $\frac{g}{100} = \frac{32}{56} = 57\%$

8. The ratio of boys to girls born in June was three to four. If there were 36 girls born, how many boys were born? Write a proportion and solve.

9. Landry bought a twelve pack of soda for \$4.58. Write a proportion and solve to find c , the number of cans she bought if she spent a total of \$87.02 on soda.

Answer the following ratio and proportional questions.

10. The ratio of five cups of water to 2 cups of flour is used to make paper maché paste. If a large tub holds 30 cups of water, how much flour should be added to make the paper maché paste?
- A 12 cups
 - B 45 cups
 - C 15 cups
 - D 3 cups

7.A.2.3 Use proportional reasoning to solve real world and mathematical problems involving ratios.

Answer the following ratio and proportional questions. Solve for x.

1. $\frac{5}{45} = \frac{60}{x}$ $x = \underline{\hspace{2cm}}$

2. $\frac{6}{12} = \frac{x}{8}$ $x = \underline{\hspace{2cm}}$

3. $\frac{1}{2} = \frac{5}{x}$ $x = \underline{\hspace{2cm}}$

4. $\frac{1}{x} = \frac{8}{64}$ $x = \underline{\hspace{2cm}}$

5. $\frac{2}{3} = \frac{8}{x}$ $x = \underline{\hspace{2cm}}$

6. $\frac{15}{x} = \frac{5}{3}$ $x = \underline{\hspace{2cm}}$

7. $\frac{7}{8} = \frac{x}{72}$ $x = \underline{\hspace{2cm}}$

8. $\frac{x}{60} = \frac{3}{10}$ $x = \underline{\hspace{2cm}}$

Determine the ratio and express in three ways.

9. In a bag of 412 peanut candies 20% are brown, 20% are yellow, 20% are blue, 20% are red, 10% are orange, and 10% are green. What is the ratio of orange to yellow and blue?

Answer the following ratio and proportional questions.

10. Susie is looking at a map, that shows the distance between the Gulf Coast and her house is 4.5 inches. According to the scale on the map, 1 inch = 36 miles.

a. How many miles are between her house and the coast?

b. If she travels 75 mph, how long will it take her to reach the coast?

c. Gas is \$2.09 a gallon, and her car gets 27 mpg. How much will she spend in gas?

Answer the following ratio and proportional questions. Solve for x .

11. This semester there are 67 students performing in the middle school's production of "Beauty and the Beastly." Of these students, 49 are 7th and 8th graders. Write a proportion and solve for s , the percent of 6th grade students that are in the play. Round your answer to the nearest tenth of a percent.

12. Abigail correctly answered 7 out of 8 questions on her pre-algebra quiz. Write a proportion, and solve to find n , the number of questions she would likely answer correctly out of 100. Round to the nearest whole number.

13. Haley purchased a dozen eggs for \$1.60. Write a proportion and solve for e , the number of eggs she purchased if she spent a total of \$14.40 on eggs.

Answer the following ratio and proportional questions. Solve for x .

14. Weatherford Middle School cheerleaders sold 225 spirit ribbons for homecoming. Of those ribbons, 198 were red and the rest were black. Which proportion can be used to find r , the percent of ribbons that were black?

A $\frac{198}{225} = \frac{r}{100}$

B $\frac{27}{198} = \frac{r}{100}$

C $\frac{27}{225} = \frac{r}{100}$

D $\frac{198}{27} = \frac{r}{100}$

15. Over 21 evenings, Adrian knitted a total of 42 inches of blanket. After 27 evenings of knitting, how many inches of blanket will Adrian have knitted in total? Set up a proportion and solve.

16. Tate took a total of 18 quizzes over the course of 6 weeks. After attending 18 weeks of school, how many quizzes will Tate have taken in total? Write a proportion and solve.

17. Jaxon's birthday party will cost \$86.00 if he invites 10 guests. If there are 23 guests, how much will Jaxon's party cost? Write a proportion and solve.

18. Hudson used 3 cups of flour to bake 45 cookies. How many cups of flour will she need to bake 100 cookies? Write a proportion and solve.

Answer the following ratio and proportional questions. Solve for x.

19. Corbyn's grandparents are planning a surprise party for his 13th birthday. It will cost \$20 if they invite 3 people. What is the maximum number of guests that can be invited if they want to keep the party budget below \$125? Write a proportion and solve.

20. Ella consumed a total of 375 calories by drinking $2\frac{1}{2}$ sodas. How many total calories will she consume if she drinks 1.5 sodas a day for the month of July? Write a proportion and solve.

Answer the following ratio and proportional questions. Solve for x .

1. $\frac{x}{40} = \frac{5}{20}$

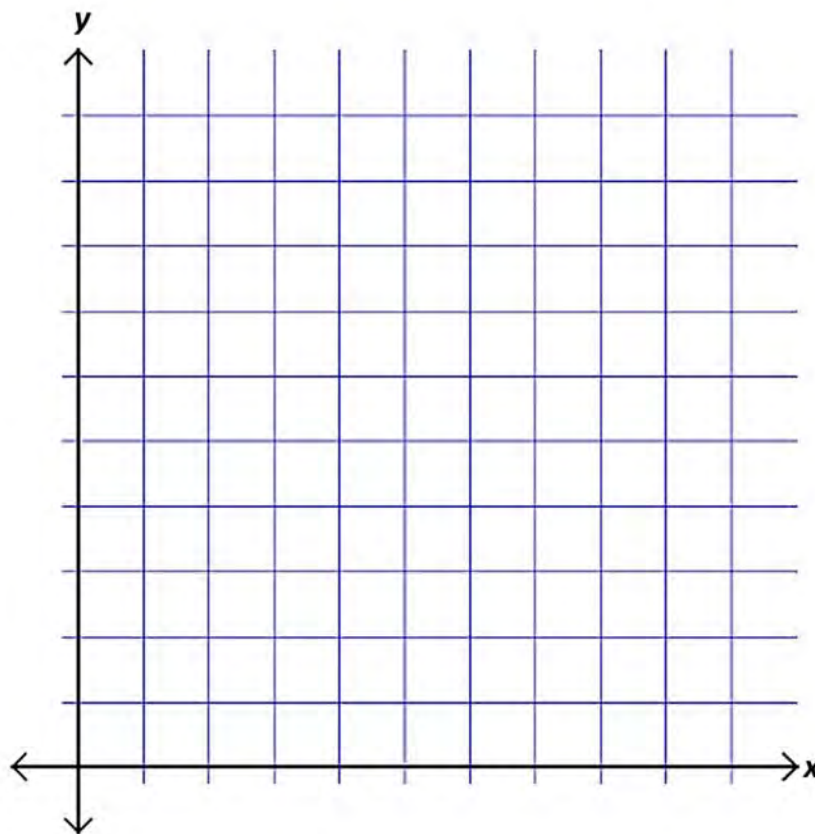
2. $\frac{2}{x} = \frac{6}{27}$

3. $\frac{3}{x} = \frac{81}{135}$

For each of the following relationships, create a table to show how the two quantities relate, graph them on the coordinate grid, and describe the unit rate or slope.

4. Jenny buys two fish sandwiches for \$5.00.

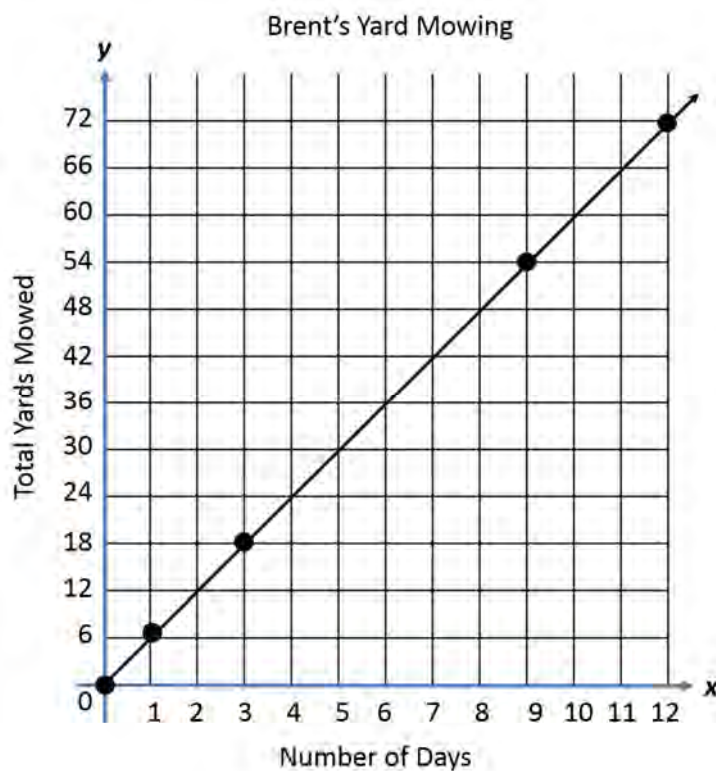
x	1	2	5	10
y		5.00		



For each of the following relationships, create a table to show how the two quantities relate, graph them on the coordinate grid, and describe the unit rate or slope.

5. Brent mows 6 yards a day.

x Days	1	3	9	12
y Yards				



Solve.

6. On a map, 1 centimeter represents 5 kilometers.
- a. If the line from one city to another is 10 centimeters, how many kilometers separate the cities?
- _____
- b. How many miles if 1 kilometer = 0.6 mile?
- _____

Solve.

7. Stacy received a 20% tip on a meal that was \$45.87. What was the amount of her tip?

8. Mike bought a car for \$3,500 and sold it for \$4,750. What is the percent of increase?

Simplify the following absolute value problems.

9. $|2| - |-9| =$ _____

10. $-|3| + |12| =$ _____

7.A.2.4 Use proportional reasoning to assess the reasonableness of solutions.**Real-World Connections**

Real-world proportional reasoning is being able to make comparisons between things. Some comparisons between objects are described in additive terms. For example, when comparing the number of boys to girls as a ratio of boys to girls 2:3, they may say there is always one extra girl for each group of boys. So, if there were 4 boys, there would be five girls.

Being able to describe proportional situations using multiplication is an indicator of proportional reasoning. Additive thinking is describing a change from 2 to 10 as adding 8. Multiplicative thinking is describing a change from 2 to 10 as multiplying by 5. Today, you will use proportional reasoning to calculate the reasonableness of solutions.

Vocabulary

proportional reasoning	the relationship between the two things are understood as a multiplicative relationship
solution	the answer to a problem

Write a ratio for each problem in three different ways.

1. One stand at the Lawton Farmers' Market had 10 potatoes, 15 ears of corn, and 6 tomatoes at the end of the day.

- a. Write a ratio for potatoes to corn on the cob.

- b. Write a ratio for tomatoes to all the vegetables.

Write a ratio for each problem in three different ways.

2. The students in Mrs. Hall's 1st hour walk or ride the bus to school. The number of students who ride the bus is 16, and the number of students who walk is 10. What is the ratio of the number of students who walk to school to the number of students who ride the bus?

3. Gail's cat had 6 kittens. She had 2 black, 3 white, and 1 brown.

- a. What is the ratio of black kittens to the total number of kittens?

- b. What is the ratio of white kittens to brown?

4. For the football game, mom made a trail mix of nuts, raisins, and chocolate chips. She used 1 cup of nuts, 2 cups of raisins, and 4 cups of chocolate chips.

- a. What is the ratio of nuts to chocolate chips?

- b. What is the ratio of nuts to raisins?

- c. What is the ratio of chocolate chips to trail mix?

Solve each problem. Use pictures, words or a table to support your answer.

5. William has 1 blue crayon for every 4 green crayons. How many blue crayons does William have if he has 24 green crayons?

Solve each problem. Use pictures, words, or a table to support your answer.

6. Lexi bought 20 apples for \$8. How many apples could she buy for \$2?

7. Do these ratios form a proportion?

36 pencils: 12 erasers

32 pencils: 14 erasers

8. Do these ratios form a proportion?

24 puzzles for every 4 games

96 puzzles for every 11 games

9. Which is the most reasonable estimate for 74% of 66?

A $\frac{1}{4} \times 64$

B $\frac{3}{4} \times 64$

C $\frac{1}{2} \times 64$

D $\frac{1}{3} \times 64$

10. Some scientists wanted to study the salmon population, so they tagged 500 salmon. Later, they caught 600 salmon and found 31 had tags. To the nearest number, what is the best estimate for the salmon populations?

7.A.2.4 Use proportional reasoning to assess the reasonableness of solutions.

Solve each problem. Use pictures, words or a table to support your answer.

1. The 7th grade class, which contains 243 students, is going on a picnic. They need 3 adults for every 27 students. How many adults are needed at the picnic?

2. The cafeteria made 250 cookies. Each student can buy 2 cookies for \$1. How many cookies did the cafeteria sell if the cafeteria sold \$80 worth? What if you sell all 250 cookies?

3. Nicki has 30 pencils. For every green pencil, she has 5 purple pencils. How many pencils of each color could she have?

Write and solve a proportion for each situation. Provide an explanation for the proportion.

4. The candy maker discovered for every 10 pieces of wrapped candy, 4 were not wrapped. How many pieces of candy were not wrapped if there were 3,640 pieces of candy?

5. A bag contains 16 peaches. How many bags are needed for 264 peaches?

6. The Carriage Hills Elementary Book Fair has books on sale at 2 for \$5. What is the total price of 13 books at this rate?

Write and solve a proportion for each situation. Provide an explanation for the proportion.

7. The volleyball team won 15 out of 25 games. At this rate, how many games will they lose if they play 75 games? How many will they win?

8. In Braden's neighborhood, the ratio of dogs to cats is 6 to 8. There are 32 cats. How many dogs are there?

9. Grandma wants to make beef stew for Sunday's dinner. There are 12 people coming to dinner. The recipe she has serves 8 and requires 4 pounds of beef. How much beef should she buy?

10. Steven is driving to Texas pulling a 12 ft. boat. If he drives 150 miles in 2 hours, how far can he drive in 7 hours?

11. Do these ratios form a proportion?

\$16.00 per 18 guests

\$48.00 per 31 guests

12. Do these ratios form a proportion?

18 cones for every 21 bowls

12 cones for every 14 bowls

Write and solve a proportion for each situation. Provide an explanation for the proportion.

13. Do these ratios form a proportion?

78 parents to 240 teens

26 parents to 80 teens

-
14. Which is the most reasonable estimate for 76% of 39?

A $\frac{3}{4}$ of 40

B $\frac{1}{4}$ of 38

C $\frac{1}{4}$ of 40

D $\frac{3}{4}$ of 38

15. Which is the most reasonable estimate for 50% of 95?

A $\frac{1}{3} \times 96$

B $\frac{3}{4} \times 96$

C $\frac{1}{2} \times 96$

D $\frac{2}{3} \times 96$

16. Some researchers wanted to study the moose population, so they tagged 99 moose. Later, the researchers flew over the area and counted a total of 460 moose, 46 were tagged. To the nearest whole number, what is the best estimate for the moose population?

-
17. Brooke used a net to capture 44 butterflies. After tagging the butterflies, she released them. Later, she caught 570 butterflies. Of the 570, 34 were marked with a tag. What is the most reasonable estimate for the butterfly population, rounded to the nearest whole number?
-

Choose the best answer.

18. Haley is printing her photographs for a state fair exhibit. She prints 11 photos, that cost \$47.81. After 4 days, she gets 3 more photos printed. She estimates the cost of the last 3 photos will be \$13.00. Is her estimate reasonable?

A No, the estimate should be lower
B No, the estimate should be higher
C Yes, the estimate is reasonable

19. Brandon made \$85.00 mowing two different neighbors' lawns. He estimates he would have enough money to buy a new video game system that cost \$580 if he mows a total of 12 additional lawns. Is his estimate reasonable?

A No, he will need to mow 2 more yards
B No, he will need to mow 2 fewer yards
C Yes, his estimate is reasonable

20. A pair of sandals costs \$42.95. They are put on sale for 27% off. Lilly estimates the sale price for the sandals to be around \$43.60. Is her estimate reasonable?

A Yes, her estimate is reasonable
B No, the estimate should be higher
C No, the estimate should be lower.

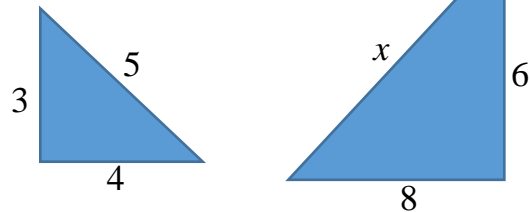
Given the following situations, solve problems involving multi-step proportional relationships.

1. On a road map of Oklahoma, the distance from Oklahoma City to Tulsa is 3.6 centimeters. What is the actual distance between the cities if the map is 1.5 centimeters = 30 miles?

2. You hike 28 miles in 14 hours. Rate = _____ miles per hour.

3. You run $\frac{1}{2}$ hour at 6 miles per hour. Distance = _____ miles

4. Find the x in the pair of similar figures.



5. Heather bought a sweater. The original price was \$25.00. It was on sale for 35% off. After the discount; how much did she pay for the sweater?

6. An actual chair is 51.5 inches. Find the dimensions of a model chair with a scale factor of 1:6. Round to the tenth.

Given the following situations, solve problems involving multi-step proportional relationships.

Find the unit rates and write in fraction and word form.

7. A bus travels 600 miles in 12 hours.

8. A store sells 6 tables for \$480.

9. Becky bought 2 pairs of shoes for \$66.

Convert the ratio to a decimal and identify as terminating or repeating.

10. $\frac{3}{10}$

7.A.3.1 Write and solve problems leading to linear equations with one variable in the form $px + q = r$ and $p(x+q) = r$, where p , q , and r are rational numbers.

Real-World Connections

In the real-world it is important to know how to use words to create a mathematical sentence to solve the problem. Story problems are real-world scenarios in which you translate written expressions into an algebraic expression or mathematical sentence. In addition, real-world scenarios are where you need to translate a problem into a written expression. Remember, you will use the order of operations to solve each equation. For example, if the words read “5 less than twice a number(n) is 11”, you set up the equation as $2n - 5 = 11$. Then solve for n .

Vocabulary

linear equation	any equation that can be written in the form $Ax + By + C = 0$ where A and B cannot be 0; the graph of a linear equation is a line
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Write an equation and solve algebraically.

1. Donna bought two packages of pencils for \$2.85 each and 4 binders for x each. Her total was \$21.66. What is the cost of each binder?

Translate each written expression into a mathematical sentence.

2. The difference of a number c and two is eight.

3. The sum of five and a number y is twelve.

4. Twenty-four is one third of a given number p .

Translate each mathematical expression into a written expression.

5. $3x - 2 = 10$

6. $4(n + 11) = 41$

7. $\frac{1}{2}x + 5 = 25$

Write an equation, and solve algebraically.

8. Carla has \$10 more than her sister Cathy. If n represents the amount of money Cathy has and their combined total is \$50, what expression represents the amount of money Carla and Cathy have?

9. Carlos sold a car he purchased 3 years ago for \$3,000, 60% of the amount he originally paid for it. If the original cost is x , write an expression that shows how much he purchased the car for.

10. Alexis earns \$350 per week for a 40-hour work week plus \$11.87 per hour for each hour over 40 hours. Write an equation that would determine her weekly wages when w are her wages, and h is the number of overtime hours worked. Complete the table below.

h	w
2	
3	
5	

7.A.3.1 Write and solve problems leading to linear equations with one variable in the form $px + q = r$ and $p(x + q) = r$, where p , q , and r are rational numbers.

Write out the algebraic expression given in each written expression.

1. 23 subtracted from the sum of 39 and c .

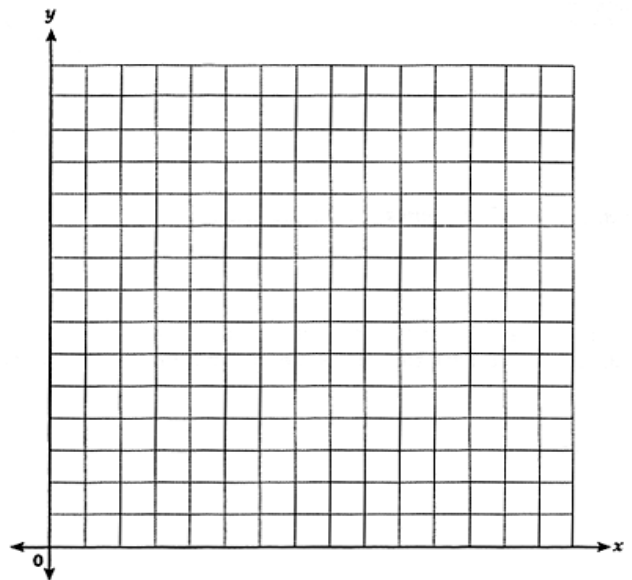
2. The sum of 2 and the product of x and 8.

3. 5 plus m multiplied by 5.

Write, solve, and graph the solutions for the following scenarios.

4. Jayden pays a park entrance fee of \$5.00. She spends 0.25¢ on each game. Write an expression to show how much she spends at the park when g = the number of times she plays a game and c = cost. Graph the following solutions. Is this a linear equation? Why or why not?

x = games	y = total cost



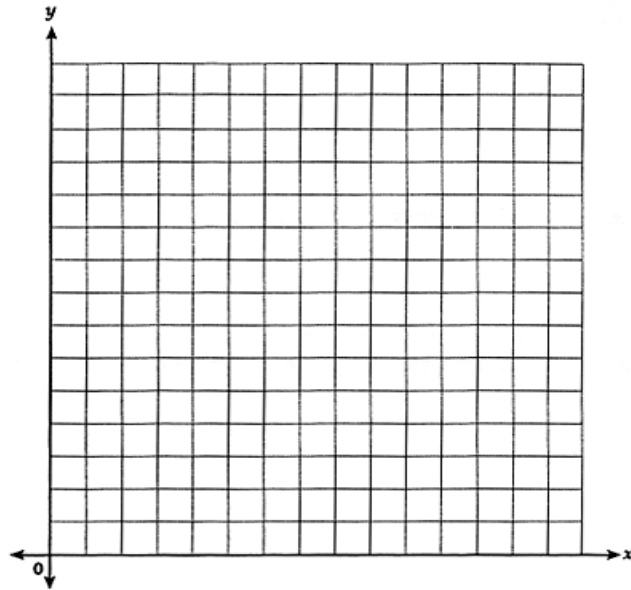
Independent Practice (7.A.3.1)

Name _____

Write, solve, and graph the solutions for the following scenarios.

5. Grandma gave Isaiah money, d dollars, to put into a savings account to start a college fund. The account has an annual interest rate of 1.19%. After 1 year, what is the value of the savings account with interest? Write an equation that would evaluate the total amount of its worth, w . Graph the following solutions.

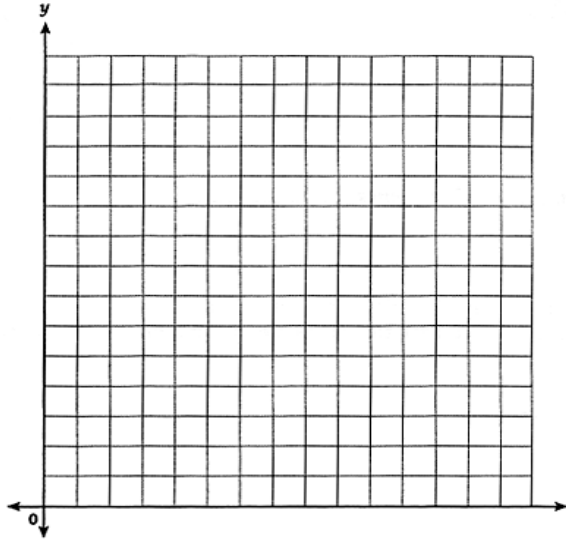
Dollars in Bank	\$500	\$1,000	\$1,500
Total Worth			



Write, solve, and graph the solutions for the following scenarios.

6. The air conditioner is not working at your house, and the repairman charges a \$50.00 service fee and \$35.00 an hour to fix it. If a represents his total charges in dollars, and b represents the hours worked. Write an algebraic expression to calculate the repairman's total bill. Graph the following solutions.

Hours Worked	3	4	5
Total Cost			



Translate the written expression into a mathematical sentence.

7. Thirty-six is one third of a given number p .

8. Two times a given number x minus 8 is ten.

Translate the mathematical sentence into a written expression.

9. $16(n + 14) = 76$

Independent Practice (7.A.3.1)

Name _____

Write an equation for the scenario.

10. Joe's dad sold a motorcycle he bought 2 years ago for \$1,500. He sold it for 40% of the amount he originally paid for it. If the original cost is x , write an expression that shows the sales price of the motorcycle.
- _____

Solve.

11. Solve for y . $\frac{y}{2} + 8 = 40$
- _____

12. Connelly bought 8 equally priced movie tickets. The total cost was \$ 190 including a \$6 service charge. This equation can be used to find t , the price of each ticket.

$$8t + 6 = 190$$

What is the price of each ticket?

13. Write and solve the expression: "Four less than twice a number is 12"
- _____

14. Solve for n . $-3n - 8 = -2$
- _____

15. Solve for w . $\frac{-w}{4} + 8 = 24$
- _____

16. Solve for c . $10c - c + 8 - 5c = 24$
- _____

Solve.

17. If one-fifth of a number and 8 has a difference of 13, what is the number? Write and equation and solve.

18. Solve for x . $\frac{x}{4} - 12 = 28$

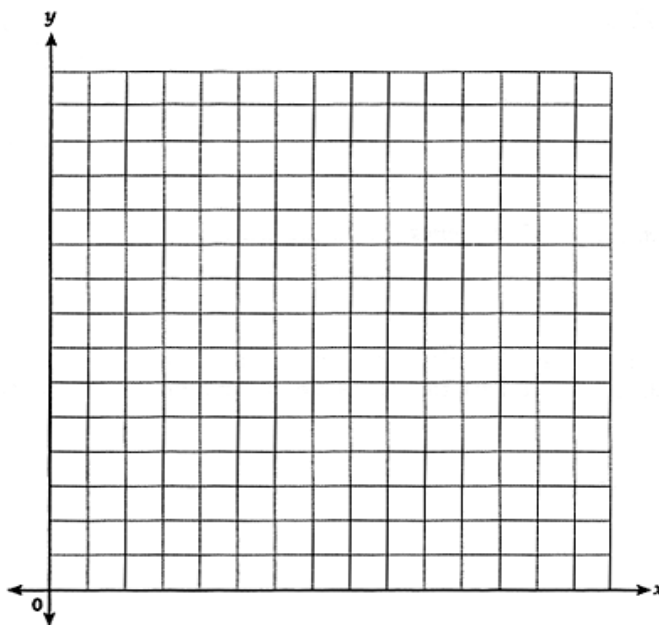
19. Solve for r . $-6r - 9 = -45$

20. Solve for m . $\frac{-m}{8} + 15 = -25$

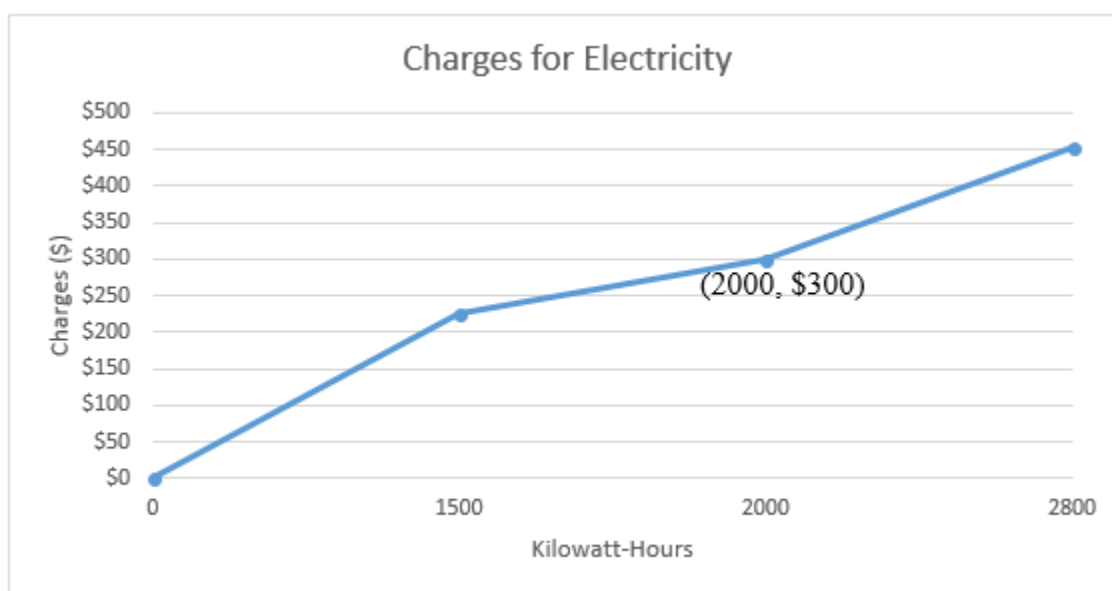
Use unit rate and proportional relationships to answer the following questions.

1. Malik is doing his math homework. He completes two problems every minute. Complete the following table and graph the solutions.

Problems	2		24
Minutes	1	10	



2. Based on the information in the graph, what is the price per kilowatt-hour used?



Solve.

3. Order the following numbers from greatest to least. $\frac{3}{5}$, 25%, $\frac{1}{3}$, 0.75
- _____

4. Complete the table below that shows the distance Bryan's family has traveled to their summer house. The house is 600 miles away. After 30 minutes, they are 562.5 miles left to their destination.

Miles		187.5		600
Time	30 minutes		240 minutes	480 minutes

5. Jasmine mails 2 CDs in an envelope and the envelope weighs 6 ounces. Write an algebraic expression and calculate the weight of 240 CDs.
- _____

Complete the table below.

	FRACTION	DECIMAL	PERCENT
6.	$\frac{7}{12}$		
7.			20%
8.		0.6	

Solve.

9. y is inversely proportional to x , and $y = 40$ when $x = 6$. What is the value of y when $x = 8$?

10. Susie is looking at a map and the distance between the Gulf Coast and her house is 4.5 inches. According to the scale on the map 1 inch = 36 miles. How many miles are between her house and the coast?

7.A.3.2 Represent, write, solve, and graph problems leading to linear inequalities with one variable in the form $x + p > q$ and $x + p < q$, where p and q are non-negative rational numbers.

Real-World Connections

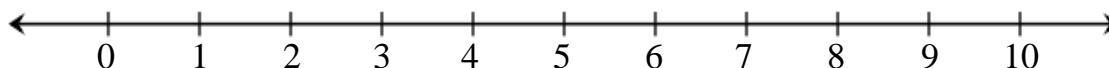
In this lesson, you will represent, write, solve and graph linear inequalities with a number line. Inequalities have more than one solution. Mathematical inequalities are around you almost every day. You may not realize they are inequalities because they are so familiar. Think about the situations such as, speed limits on the highway, minimum payments on credit card bills, number of text messages you can send each month from your cell phone, and the amount of time it will take to get from home to school. These can be represented as mathematical inequalities. You use mathematical thinking as you think through these situations daily.

Vocabulary

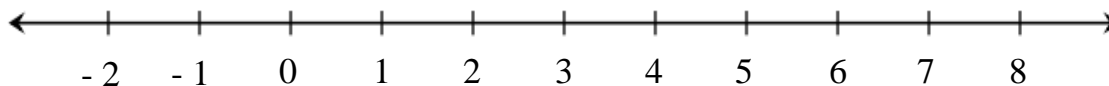
linear inequalities	Just as linear equations $y = 3x + 2$, but equation will have an inequality symbol $<$, $>$, \leq , or \geq instead of an $=$
non-negative rational numbers	can be expressed as the quotient of two integers, a numerator, and a non-zero denominator

Graph the following inequalities.

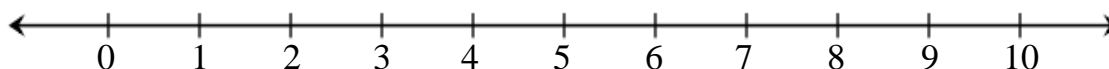
1. $x > 5$



2. $x < 4$

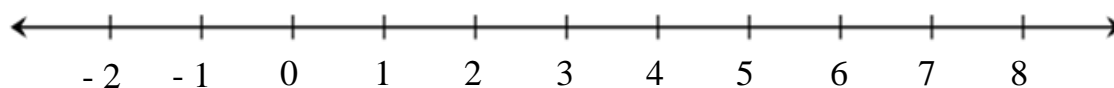


3. $x \geq 6$

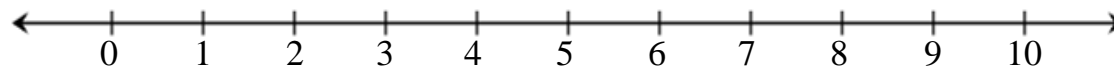


Graph the following inequalities.

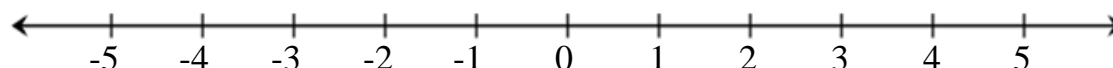
4. $x \leq 2$



5. $x \leq 8$

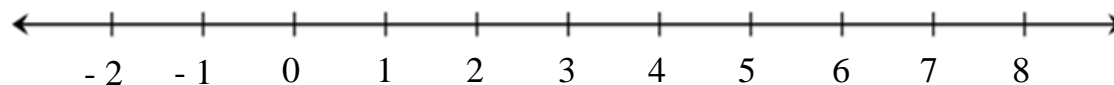


6. $-3 \leq x$

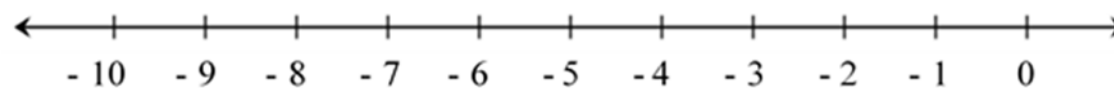


Solve and graph the following inequalities.

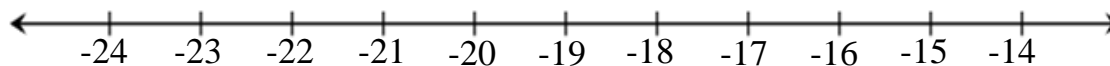
7. $x - 4 > -2$



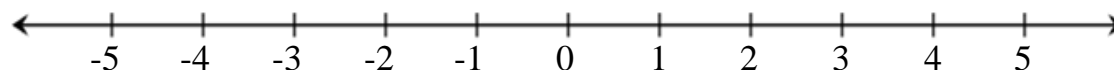
8. $x + 12 \leq 8$



9. $\frac{x}{-5} > 4$

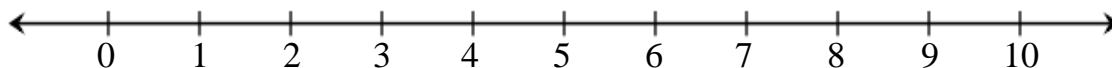


10. $4x \geq -12$



Solve and graph the following inequalities.

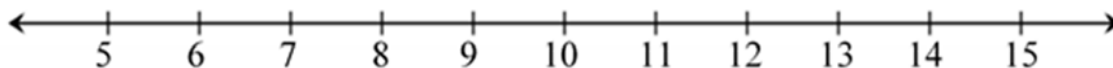
11. Ruby is 12 years old. If you add her age and her brother's age, x , together you get more than 19 years. How old is Ruby's brother? Graph your solution.



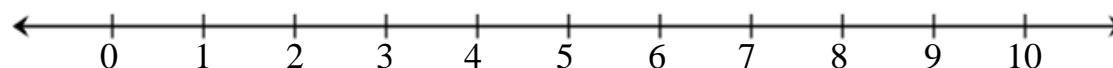
7.A.3.2 Represent, write, solve, and graph problems leading to linear inequalities with one variable in the form $x + p > q$ and $x + p < q$, where p and q are non-negative rational numbers.

Graph the following inequalities.

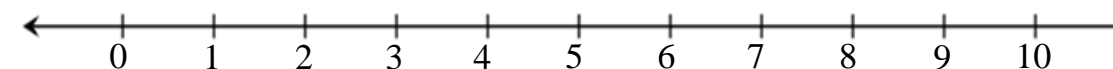
1. $x > 10$



2. $7 \geq x$

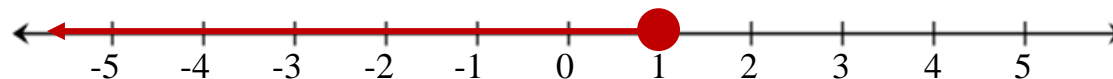


3. $x < 3$



Give the inequality represented by each of the following number lines.

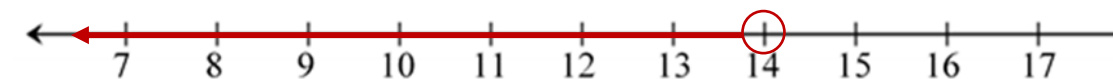
4. _____



5. _____

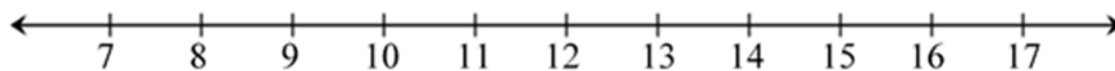


6. _____

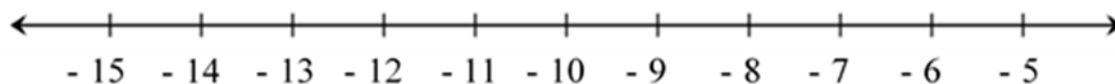


Solve and graph the solution set for the following inequalities.

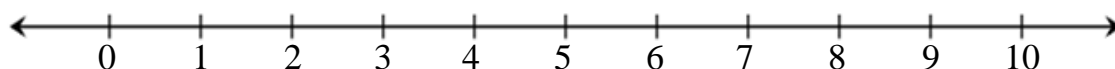
7. $x - 8 \geq 5$



8. $\frac{x}{4} \geq -3$

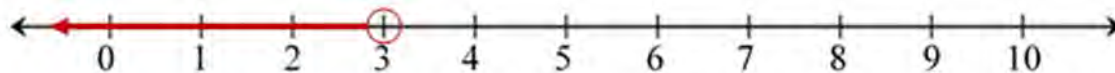


9. $10x > 50$



10. Chino had to read more than 210 pages in 7 days. How many pages, x , must he read a day to complete his assignment? Solve and graph.

11. What inequality does this number line show?



12. What inequality does this number line show?



13. $n + 8 > 9$

14. $\frac{d}{2} \geq 4$

Independent Practice (7.A.3.2)

Name _____

Solve and graph the following inequalities.

15. $c + 4 < 10$

16. $2h < 12$

17. $-17 < m - 9$

18. $n + 5 < 17$

Circle the best answer.

19. Which inequality represents the statement below?

A number increased by 9 is greater than negative 23.

A $n + 9 < -23$

B $n + 9 \geq -23$

C $n + 9 \leq -23$

D $n + 9 > -23$

Write an equality to represent the following statement, solve and graph.


20. Five less than a number is less than or equal to negative five.

Solve.

1. If four pens cost \$1.36, how much does one pen cost? Write a proportion and solve.

2. Convert the following ratio to an equivalent decimal and identify as terminating or repeating.

$$\frac{7}{8} = \underline{\hspace{2cm}}$$

3. Compare the rational numbers using $<$, $>$, or $=$: $2\frac{5}{8}$  2.756

4. Complete the following table.

Fraction	Equivalent Fraction	Decimal	Percent
$\frac{8}{10}$			

5. Round each number to its greatest place value and estimate the product.

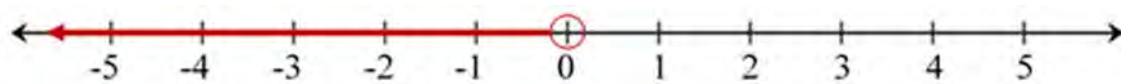
753(8) =	Prediction	Estimation	Exact Answer

6. Model the multiplication expression with a picture or number line.

$$6 \times 8$$

Give the inequality represented by each of the following number lines.

7. _____



8. _____



Write an inequality to represent the following statements.

9. The temperature today will be at most 90° . _____

10. Yesterday, there was less than 3 inches of rain. _____

7.A.3.3 Represent real world or mathematical situations using equations and inequalities, variables and rational numbers.

Real-World Connections

Why do you need to know about equations and inequalities? In computers and computer games, the action and movement in your favorite games use equations. Equations are used every day in the real-world. In business, selling price – cost = profit. Anyone who works in medicine must know about equations to properly dispense medicine. Builders need to be able to use equations to create a building from a much smaller set of drawings. Would you like to be a private pilot and fly your own small plane? You can't pass the test to get a pilot's license unless you can work with equations and calculate how to load the plane correctly with people and baggage.

This lesson will help you connect algebraic equations and inequalities to real-life situations. In addition, you will expose and address misconceptions concerning the meaning of variables in equations and inequalities.

Vocabulary

equations	number sentence that uses the equal sign ($1 + 2 = 3$)
inequalities	inequality occurs when things are not equal; <u>there are four types of inequalities:</u> <ul style="list-style-type: none"> • $a > b$... a is greater than b • $a < b$... a is less than b • $a \geq b$... a is greater than or equal to b • $a \leq b$... a is less than or equal to b
variable	a quantity that can change or that may take on different values

Write an equation or inequality for each situation.

- The temperature tomorrow will be above 65° .

Write an equation or inequality and solve for each situation.

2. Mr. Smith bought several drink boxes for 0.50¢ each and a bag of apples for \$2.39. The total cost of his purchase was \$5.89. Write an equation and solve to find out how many drink boxes Mr. Smith bought.

3. Diego scored more than 5 times as many points as Alejandro, who scored 7 points. How many points, p , did Diego score?

4. There was more than 3 times as much rain this June (r) as there was in May, which had 3 inches. How much rain was in June?

5. Isabel is very excited about the senior prom. With the \$3,000 she has to spend, Isabel bought 3,000 flowers at .30¢ each, 300 strands of lights for \$4.99 each, 50 table cloths at 0.99¢ each and 100 packages of streamers for 0.50¢ each. Write an inequality which describes how many souvenir key rings, k , she can buy if the key rings cost 0.50¢ each. Explain.

6. Ryan earned x number of dollars babysitting his little brother in July. His older brother, Mike, earned twice plus \$5 what Ryan earned. Their sister, Stormy, earned \$10 less than two times of what Ryan earned. All together they earned \$255. How much did each of them earn?

7. The number of parts in an inventory, x , minus 90 parts sold today is 280. What is the value of x ?

Circle the best answer.

8. Which situation represents this inequality?

$$x \geq 12$$

- A Twelve jars will fill the box.
- B The students were required to run at least 12 laps.
- C Use the yardstick to find classroom objects longer than 12 inches.
- D The ride is for students 12 years old and younger.

9. The inequality below can be used to find how many liters of soda the students drank before the class party.

$$x - 7 > 22$$

How many liters of soda were there when the party started?

- A less than 15
 - B more than 29
 - C more than 15
 - D exactly 29
10. The inequality below can be used to find how many stuffed animals Harper has after giving some to her little sister Heather.

$$a + 13 < 57$$

How many stuffed animals does Harper have now?

- A more than 44
- B less than 70
- C less than 44
- D exactly 44

7.A.3.3 Represent real world or mathematical situations using equations and inequalities, variables and rational numbers.

Write and evaluate an equation or inequality for each situation.

1. Alexandria has a base pay of \$600 increased by her commission (x) totals \$740.

2. The temperature, t , decreases 10° , it will be colder than 65° . What is the temperature outside?

3. Xavier is a waiter at a restaurant. He earns \$2.19 per hour plus tips. On Saturday, he worked 8 hours and received tips (t). His daily pay is \$156. Write an equation showing what Xavier made in tips on Saturday.

4. José buys s shares of a social media company at \$114.95 per share. He later sells the shares at \$135.29 per share. Write an equation to show how much money (m) José has made on 5 shares.

5. Rick's dog weighs at least 40 pounds more than Mary's dog. Mary's dog weighs 36 pounds. Let w represent Rick's dog's weight. How much does his dog weigh?

6. Movie tickets for three children cost \$36 minus \$6.00. Find the cost of a child's ticket.

Independent Practice (7.A.3.3)

Name _____

Read the problem, write the equation or inequality for the given situation and solve. Show your work for each step.

7. The city animal shelter has more than 105 dogs after the recent flooding. At the end of last month they had 56 dogs. Let d represent how many dogs were brought to the shelter. (Assume they did not release any dogs.)

8. Rebecca spent \$65.00 for video games she bought online. The games cost \$10.00 each and she paid \$5.00 in shipping for the order. How many games did she buy?

9. The track team is preparing for a big meet. DJ just finished a 15 mile run. That distance is 5 miles farther than 2 times the distance he could run when he started training. How far could DJ run when he started training?

10. Three friends timed how long it took to do their math homework. Chloe took x number of minutes. Patrick took twice as long minus 5 minutes as Chloe. Aaron took 3 times as long plus 8 minutes as Chloe. Combined, they spent 45 minutes doing their homework. How long did it take each student to complete their homework?

11. Write an inequality to represent the following situation.
A local youth group wants to raise more than \$320 on a bake sale, and \$103 has already been raised.

Solve.

12. The inequality below can be used to find how much money Richard has left to spend after buying a new skateboard.

$$x + \$17 < \$74$$

How much money does Richard have left to spend?

Read the problem, write the equation or inequality for the given situation.

13. Write an inequality to represent the following situation.
Stafford gave away 24 baseball cards and now has less than or equal to 83 baseball cards.
-

14. Write an inequality to represent the following situation.
Marci ran 6 miles yesterday and plans to run at least 26 miles total before the end of the week.
-

15. Terin babysits to earn extra money. She charges a flat fee of \$10, plus \$5 per hour. If one of her customers spent less than \$60, write an inequality that could be used to solve for the number of hours the customer paid for babysitting.
-

16. Collin must run more than 70 miles total to reach his goal. He has run 40 miles already, and runs 4 miles per day. Write an inequality that could be used to find d , the number of days Collin needs to run to reach his goal.
-

Read the problem, write the equation or inequality for the given situation.

17. Lucy is selling candy bars for \$1.50. So far, she has earned \$115.50. She needs to earn more than \$180 to reach her sales goal of winning a gift card. How many more candy bars, c , does Lucy need to sell to reach her goal? Write an inequality and solve.

18. Colby needs more than 715 total points on homework in his math class to pass. He only has 209 points and wants to complete some bonus point assignments worth 25 points each. How many bonus assignments does Colby need to complete to pass his math class? Write an inequality and solve.

Circle the best answer.

19. Joe must spend less than 150 minutes playing video games in one day. He plays different games for 30 minutes each, and Joe has already played 60 minutes today. Choose the inequality that could be used to find how many more video games Joe can play today.

A $60g + 30 < 150$

B $30g + 60 < 150$

C $30g - 60 < 150$

D $30g + 60 \leq 150$

20. Allison must write an essay that has no more than 3,500 words for an English class. She has already written 1,148 words, and writes at a rate of 287 words per day. Which of the following inequalities could be used to solve for d , the number of days it will take Allison to finish her paper?

A $287d + 1148 \leq 3500$

B $287d - 1148 > 3500$

C $287d + 1148 < 3500$

D $287d + 1148 > 3500$

Change the following phrases into algebraic expressions.

1. 63 multiplied by the difference of x and 5.

2. The sum of 4 and 5 divided by 3 times x .

Answer the following ratio and proportion questions. Solve for x .

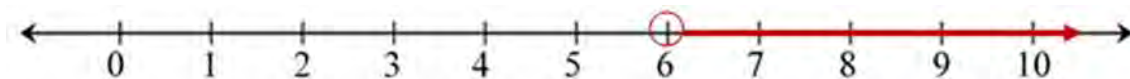
3. $\frac{7}{17} = \frac{x}{850}$ $x =$ _____

4. $\frac{30}{100} = \frac{150}{x}$ $x =$ _____

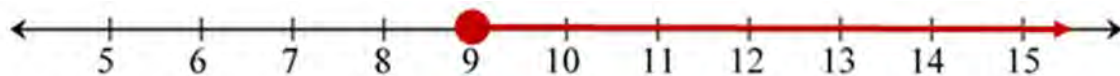
5. $\frac{9}{56} = \frac{x}{168}$ $x =$ _____

Give the inequality represented by each of the following number lines.

6. _____



7. _____



8. _____



Solve the inequality and equation word problem.

9. The hardware store is conducting an inventory for taxes. Lisa, Luis, Sylvia, and Ramon are counting the tools in four boxes in the stock room. Lisa counted x in her box. Luis counted 3 times as many as Lisa plus 10 in his box. Sylvia counted twice as many as Lisa. Ramon counted twice as many as Lisa minus 10. They counted 384 tools in the boxes. How many did each person count?

Solve.

10. Compare: Write $>$, $<$, or $=$.

$$3.726 \quad \bigcirc \quad 3.542$$

7.A.4.1 Use properties of operations (limited to associative, commutative, distributive) to generate equivalent numerical and algebraic expressions containing rational numbers, grouping symbols and whole number exponents.

Real-World Connections

The properties of operations will help you solve mathematical and real-world problems. You can visualize the associative property in the making of concrete from a combination of three ingredients: cement, gravel, and water. If first you pour a bag of cement into a bucket with some gravel, add water to this mix and stir, everything will work fine. However, if you pour cement and water into the bucket, stir, and wait a while, you will find you cannot mix in the gravel because already the cement has set rock hard! In other words, adding cement, gravel, and water to make concrete is not an associative process. You will look at the associative, commutative, and distributive property in detail, and apply it to algebraic expressions and real-world mathematical scenarios.

Vocabulary

properties of operations	the rules in relation to operations on numbers
associative property	<u>of addition</u> $(a + b) + c = a + (b + c)$ <u>of multiplication</u> $(a \times b) \times c = a \times (b \times c)$
commutative property	in addition and multiplication, numbers may be added or multiplied together in any order
distributive property	multiplying a number is the same as multiplying its addends by the number, then adding the products
equivalent numerical expressions	two numerical expressions are equivalent if one can be obtained from the other using the properties of operations, such as the commutative, associative, and distributive properties, as well as by representing numbers in the expressions in different but equivalent forms
algebraic expressions	a mathematical phrase combining numbers and/or variables
whole number exponents	the numbers 0, 1, 2, 3...that indicate how many times the base is used as a factor, e.g., in $4^3 = 4 \times 4 \times 4 = 64$, the exponent 3, indicating 4 is repeated as a factor three times

Circle the best answer.

1. Which of the following illustrates the commutative property of addition?

- A $6 + 7 = 7 + 6$
- B $6 + 7 = 8 + 5$
- C $6 + 7 = 10 + 3$
- D $6 + 7 = 9 + 4$

2. Which of the following illustrates the commutative property of multiplication?

- A $5 \times 6 = 10 \times 3$
- B $5 \times 6 = 8 \times 4$
- C $5 \times 6 = 6 \times 5$
- D $5 \times 6 = 2 \times 15$

Complete.

3. Using the commutative property fill in the missing number.

- A $3 + \underline{\quad} = 2 + 3$
- B $3 + 5 = 8, 5 + 3 = \underline{\quad}$
- C $9 \times 8 = \underline{\quad} \times 9$
- D $\underline{\quad} \times 3 = 3 \times 9$

Discuss.

4. The commutative property does not work for subtraction or division, discuss and demonstrate.

Circle the best answer.

5. Which of the following illustrates the associative property of multiplication?

A $(6 \times 8) \times 10 = (2 \times 24) \times 10$

B $6 \times (8 \times 10) = (6 \times 8) \times 10$

C $6 \times (8 \times 10) = 6 \times (2 \times 40)$

D $(6 \times 8) \times 10 = (8 \times 5) \times 10$

Choose the best answer.

6. Which of the following illustrates the associative property of addition?

A $4 + (3 + 5) = (5 + 5) + 2$

B $4 + (1 + 5) = 5 + (2 + 3)$

C $3 + (1 + 5) = 3 + (4 + 2)$

D $3 + (5 + 1) = (3 + 5) + 1$

Complete.

7. Using the associative property fill in the missing number.

A $8 + (5 + 3) = 16$ so $(8 + 5) + 3 = \underline{\hspace{2cm}}$

B $5 + (\underline{\hspace{1cm}} + 6) = (5 + 8) + 6$

C $\underline{\hspace{1cm}} \times (7 \times 8) = (6 \times 7) \times 8$

D $4 \times (2 \times 8)$ is also equal to $\underline{\hspace{2cm}}$

Discuss.

8. The associative property does not work for subtraction or division. Discuss and demonstrate.

Circle the best answer.

9. Identify the distributive property.

- A $4 + 5 = 5 + 4$
- B $7 \times (3 \times 5) = (7 \times 3) \times 5$
- C $(9 + 4) + 6 = 9 + (4 + 6)$
- D $5(7 + 8) = (5)(7) + (5)(8)$

Complete.

10. Using the distributive property fill in the missing number.

- A $2(x + 5) = \underline{\hspace{1cm}}x + (2)(5)$
- B $6(7 - 4) = (6)(7) - (6)(\underline{\hspace{1cm}}) = 18$
- C $10(2 \times 9) = (10)(\underline{\hspace{1cm}}) \times (10)(\underline{\hspace{1cm}}) = 1,800$

Discuss.

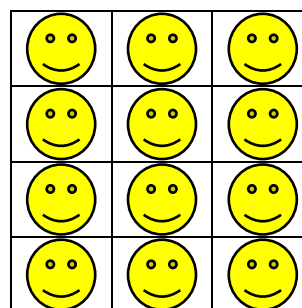
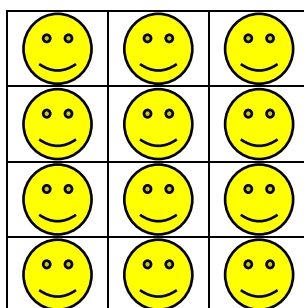
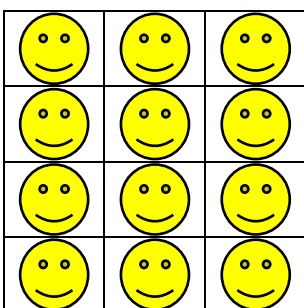
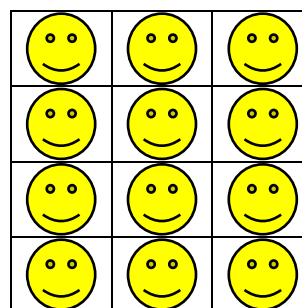
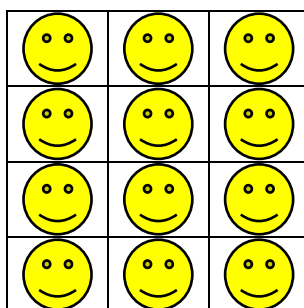
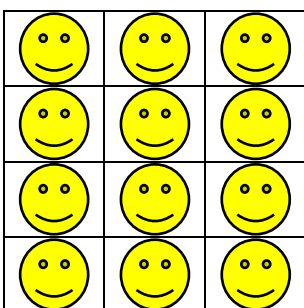
11. The distributive property does not work for division. Discuss and demonstrate what happens if we are given $\frac{10}{3+7}$ and use the distributive property.

12. Identify each property.

- A $m(n \cdot p) = (m \cdot n)p$ _____
- B $c(d + e) = cd + ce$ _____
- C $a + b = b + a$ _____
- D $(x + y) + z = x + (y + z)$ _____
- E $p \cdot q = q \cdot p$ _____

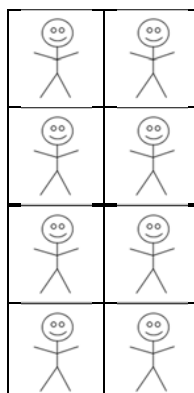
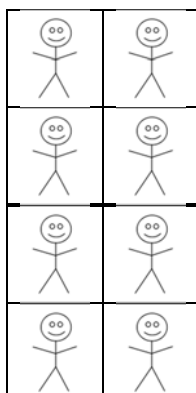
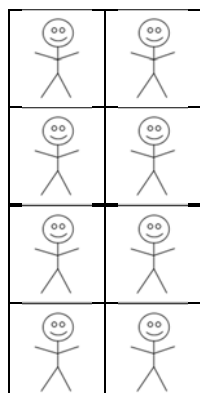
Discuss.

13. How many smiley face cookies do you see?



Do you see 6 boxes of 12, which is $6 \times 12 = 72$? Do you see 12 sets of 6, which is $12 \times 6 = 72$. These two being equal are an example of the commutative property of multiplication. Could you see something else? Maybe you see 12 cookies \times 3 columns \times 2 rows? Maybe you see 36 cookies \times 2 rows? You might see 24 cookies \times 3 columns? Use the associative property to get your answer.

14. Mrs. Hall is bringing donuts to school tomorrow for her top class. Use the diagram below and the associative property to create three examples of calculating the number of donuts Mrs. Hall will need to bring to class.



7.A.4.1 Use properties of operations (limited to associative, commutative, distributive) to generate equivalent numerical and algebraic expressions containing rational numbers, grouping symbols and whole number exponents.

Using the commutative property, fill in the blank.

1. $m \cdot n = n \cdot \underline{\hspace{1cm}}$
2. $56 \cdot \underline{\hspace{1cm}} = 13 \cdot 56$
3. $\underline{\hspace{1cm}} + 17 = 17 + 13$

Evaluate using the distributive property.

4. $-10(8n + 5) =$
5. $5(6 + 3r) =$
6. $7(20g + 16) + 13 =$

Select which choice is not an equivalent equation.

7. Which expression is not equal to $4(6 \cdot 5)$?
 - A $(4 + 6) + 5$
 - B $24 \cdot 5$
 - C $4 \cdot 30$
 - D $(4 \cdot 6)5$
8. Which expression is not equal to $(9 \cdot 5)7$?
 - A $45 \cdot 7$
 - B $9(5 \cdot 7)$
 - C $9 \cdot 35$
 - D $9 \cdot 30$

Evaluate each situation, name the operation property you used, and explain why.

9. Jan is playing golf. She has ten dozen and 6 golf balls. How many golf balls does she have?

10. Mr. Thomas, the art teacher, bought crayons for his class. There are four boxes, and each has 20 packages of crayons. Each package has 15 crayons. How many crayons did he buy? How many packages did he buy?

Choose the best answer.

11. Using the correct order of operations, which expression results after the first step of simplifying the following? $9(4 \div 2)^2 + 1 - 6$

- A $(36 \div 18)^2 + 1 - 6$
B $9(8 \div 4) + 1 - 6$
C $9(4 \div 2)^2 + 5$
D $9(2)^2 + 1 - 6$

12. Solve the expression.
 $8 + 5 \cdot (12 - 6 \div 3)$

Identify the property used.

13. Which property of addition is shown?
 $7 + (8 + 5) = (7 + 8) + 5$

Identify the property used.

14. Which property of multiplication is shown?

$$1 \times 5 - 1 \times 2 = 1 \times (5 - 2)$$

15. Which property of addition is shown?

$$a + b + c = b + c + a$$

Solve.

16. Simplify

$$2(2 + y) + 5y(8 + 3)$$

17. Simplify

$$(s + 6) + 1$$

Use the given property to simplify or rewrite the expression.

18. Rewrite the following expression using the Associative Property.

$$(7a + 6z) + (12z + 4a)$$

19. Simplify using the Distributive Property.

$$-4(5w + 2)$$

20. Simplify using the Distributive Property.

$$(-3 - 6x)(-3)$$

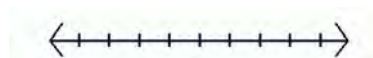
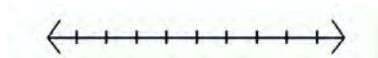
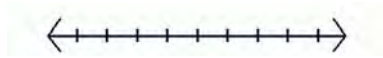
Solve and graph the solution sets for the following inequality or equation.

1. Molly, who loves cars, was hired at the local car dealership for a summer job. She gets paid \$10.50 an hour for the first 40 hours and \$15 for each hour of overtime. In addition, she receives a 10% commission on all sales. This week she made a \$1,200 sale and worked 40 hours. She wants to make at least \$600 this week. How much overtime does she need on Saturday?
- _____

2. $17x + 10 = -24$

3. $\frac{t}{3} + 3 > 7$

4. $\frac{3}{4}x \geq 15$



Using the distributive property which is the expanded form of this expression?

5. $3.5(7 + 2.6) - 5$

- A $(3.5 \cdot 7) + (3.5 \cdot 2.6) - (3.5 \cdot 5)$
B $(3.5 + 7) \cdot (3.5 + 2.6) - 5$
C $(3.5 \cdot 7) + (3.5 \cdot 2.6) - 5$
D $(3.5 + 7) + (2.6 - 5)$

Which of these use the distributive property to find the value of x .

6. $-23(6.3) = x$

A $-23(6.3) = 2 + 30(6.3) = 2 - 30(6.3) = x$

B $-23(6.3) = 2 - 30(6.3) = 2 + 30(6.3) = x$

C $-23(6.3) = -23(0 - 6.3) = -23(0) - 23(-6.3) = x$

D $-23(6.3) = -23(6.3 - 0) = -23(6.3) - 23(0) = x$

Solve.

7. Laney walks 0.23 miles to school each day. How many miles does she walk total to and from school in 5 days?

8. Complete the following table.

Exponents	Factors	Product
26^3		

Solve.

9. $3(5)^2 - 3^3$

10. Rachel and Doug collect marbles. Rachel has 6 red marbles and 8 blue marbles. Doug has 5 times more red marbles than Rachel and 10 green marbles. How many marbles do they have in all?

7.A.4.2 Apply understanding of order of operations and grouping symbols when using calculators and other technologies.

Real-World Connections

When you encounter a mathematical problem in math class or in the real-world, you may solve the problem differently than someone else. However, everyone must follow the order of operations, which is a consistent order adopted for solutions to be the same. Calculators and other technologies were designed to make mathematical calculations faster. But, these technologies are only a tool and the person using the tool must know the order or operations for the solution to be correct. In this lesson, a calculator and order of operations is used to evaluate expressions.

Vocabulary

order of operations	Rule for evaluating expressions <ol style="list-style-type: none"> 1. perform all operations inside grouping symbols and/or above and below a fraction bar in the order in steps 2, 3, and 4 2. find the value of any powers or roots 3. multiply, including division, from left to right; add, including subtraction, from left to right
calculator	a mathematical tool; a small electronic device with a key pad and visual screen for making math calculations

Evaluate:

1. $19 - 8 \times 5 \div 10 + 6 \div 3 = \underline{\hspace{2cm}}$

2. $(16 - 6)^2 \div 2 - 3^3 = \underline{\hspace{2cm}}$

3. $(-13 - 12)(-4^2) = \underline{\hspace{2cm}}$

4. $\frac{(8)(10 \div 2)}{5} = \underline{\hspace{2cm}}$

Choose the correct solution.

5. $100 - 9^2 + 2$

A 84

B 21

C 17

6. $3 \cdot 5 - 45 \div 3^2$

A 10

B 5

C 0

7. $2^5 - (3 \cdot 7 \div 7)$

A 30

B 7

C 29

Find the mistake in the given problems. There may be some problems in which there is no error.

Problem	What is the error?	Work problem correctly
8. $-10 \div 2 \cdot (-3)$ $-5 \cdot (-3)$ 15		
9. $(-3)^2 \div (-3)$ $6 \div (-3)$ -2		

Write an expression for the problem, and evaluate the expression using the order of operations.

10. Bruce charged David and Ricky \$42 for parts and \$12 per hour for labor to repair their motorcycle. If he spent 3 hours repairing the bike, how much money do David and Ricky each owe him?

7.A.4.2 Apply understanding of order of operations and grouping symbols when using calculators and other technologies.



Evaluate.

1. $[(-7) + (-2)]x - 18^2 - (-9) \times 3 = \underline{\hspace{2cm}}$

2. $8^2 \cdot 9 \cdot 3 - (4 - 6) = \underline{\hspace{2cm}}$

3. $(11 + 10) \times 4^2 - 12 \times 3 = \underline{\hspace{2cm}}$

4. $10 - (16 \div 8)^2 \cdot 5 = \underline{\hspace{2cm}}$

Find the mistake in the given problems. There may be some problems in which there is no error.

Problem	What is the error?	Work problem correctly
5. $(-8) \cdot (-9) = -72$		
6. $-100 \div (-4) = 20$		
7. $(-3)^3 = -9$		
8. $\frac{-90}{-10} = 9$		

Write an expression for this problem, and evaluate the expression using the order of operations.

9. Emily has \$42. She buys 6 packs of baseball cards costing \$3 each and a display book for \$8. How much does Emily have left?

10. Ethan's son is having his birthday party at the movie theater. He invites 9 friends to his party. He buys one ticket for himself at \$7.50, 10 movie tickets for his son and his friends for \$5.50 each, 5 large popcorns at \$6 each, 2 boxes of candy at \$2 each, and 10 small drinks at \$3.50 each. How much did Ethan's dad spend in all, and how much did he spend per child?

Evaluate each expression.

11. $10 - 6 \div 6 + 3 =$ _____

12. $2^3 + 4(8 - 15) =$ _____

13. $10 \div 5 \times 6^2 + (8 + 2) =$ _____

14. $6^2 + 9 + 6^2 \times 1^2 \div 1 =$ _____

15. $8 + 5 \times (12 - 6 \div 3) =$ _____

Circle the best answer.

16. Choose the expression below that totals 15.

A $(9 \div 3 + 6) \times 2$

B $9 \div (3 + 6) \times 2$

C $9 \div 3 + (6 \times 2)$

D $9 \div (3 + 6) + 2$

Circle the best answer.

17. Given the expression:

$$4 + 10 - (12 \div 3)$$

Which of the following would you do first?

- A Add 4 and 10
- B Divide 12 by 3
- C Subtract 12 from 10
- D Subtract 12 from 14

Correct.

18. Place a set of parentheses in the expression below so the answer is 13.

$$5 + 6 - 2 \times 2$$

Evaluate each expression.

19. $2 + 2 \times 2 + 2 \times 2 - 2 \times 2 =$ _____

20. $9 \times (5 - 1)^3 - 576 =$ _____

Solve and graph the solution set for the following inequalities.

1. $\frac{1}{4}y - 3 < 2$



Simplify the absolute value problem.

2. $-|-37| + |-19| =$ _____

Choose the best answer.

3. Which of the following equations represents a proportional relationship?

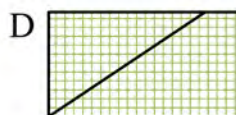
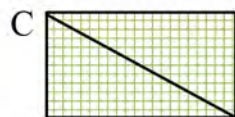
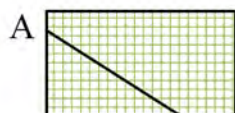
A $y = \frac{3.7}{x}$

B $\frac{y}{x} = 3.7$

C $x + y = 3.7$

D $x = 3.7$

4. Which of the following graphs represents a proportional relationship?



Identify the correct operation property.

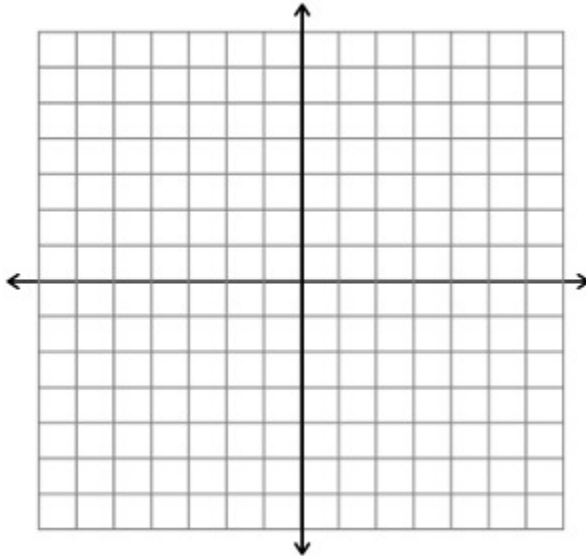
5. When two numbers are added, the sum is the same regardless of the order of the addends. For example: $a + b = b + a$

6. When three or more numbers are added, the sum is the same regardless of the grouping of the addends. For example $(a + b) + c = a + (b + c)$.

Complete the table to show how the two quantities relate, graph them on a coordinate grid, and describe the unit rate or slope.

7. Larry buys 6 shirts for \$90.

x	2	4	6	8
y			\$90	



Evaluate.

8. Logan bought a pair of shoes marked down from \$95 to \$78. What is the discount expressed as a percentage?

Write an expression for the problem, and evaluate the expression using the order of operations.

9. Max had \$350 in his bank account and withdrew \$200. He bought two pairs of jeans for \$34.00 each, 2 shirts for \$16.00 each, and 2 pairs of shoes for \$24.00 each. He deposited what he had left plus his \$150 pay check. How much money does Max have in his account at the end of the shopping day?

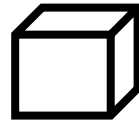
10. Lynn is buying a new pair of skis for \$550. She put 10% down and received a student discount of \$50. Her mother gave her $\frac{1}{2}$ of the balance for her birthday. Find the amount Lynn still owes on the skis.

7.GM.1.1 Using a variety of tools and strategies, develop the concept that surface area of a rectangular prism with rational-valued edge lengths can be found by wrapping the figure with same-sized square units without gaps or overlap. Use appropriate measurements such as cm^2 .

Real-World Connections

The variables l , h , and w are the lengths of the 3 sides used to calculate the surface area of a rectangular prism. The area is made up of six rectangles that cover it. But, you do not have to compute all six because you know the top and bottom are the same, the front and back are the same, and the left and right sides are the same. You can use the formula $2(wl + hl + hw)$. The given solution is in square units. The most common uses for surface area in a real-world situation are home-improvement-projects using paint. In these situations, you may not need to find the total surface area. For example, you would not usually paint the ceiling or floor.

l = length
 h = height
 w = width

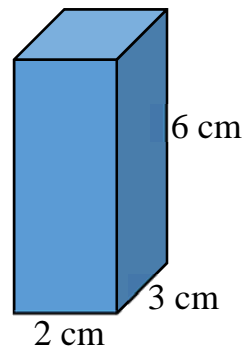
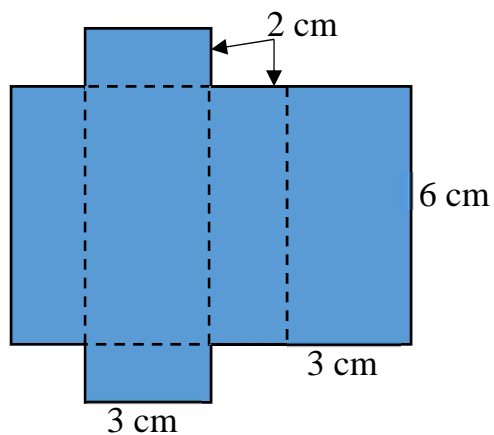


Vocabulary

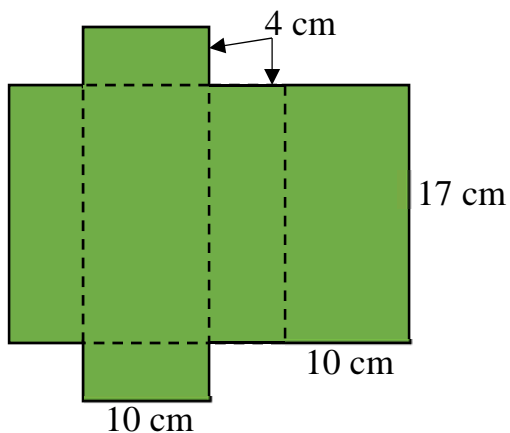
surface area	the total measure of the area of the faces of a rectangular prism; equivalently, the total area of a net for the prism
rectangular prism	a three-dimensional object constructed from three pairs of parallel rectangles (called faces) that share common edges to form an enclosed space, so opposite rectangles are congruent; the vertices of the rectangles are the vertices of the prism, and the sides of the rectangles are called edges; a cube is a rectangular prism in which each face is a square of the same size
rational-valued length	distance from one end to the other using rational number values, a number expressible in the form $\frac{a}{b}$ or $-\frac{a}{b}$ for some fraction $\frac{a}{b}$; the rational numbers include integers
square units	the area of a square each of whose sides measures 1 unit; it is used to measure area
gaps	unfilled spaces
overlaps	extend over to cover partially
cm^2	a cm raised to the second power which is indicated by a small 2 to its upper-right

Use the net and diagram below to solve for surface area. $SA = 2(wl + hl + hw)$

1. $SA =$ _____

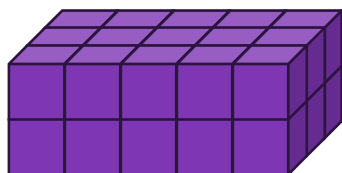


2. $SA =$ _____



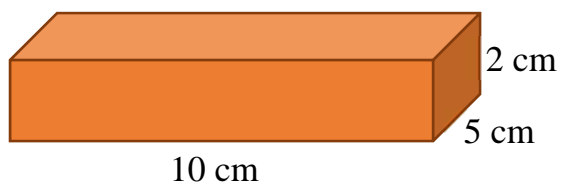
Find the surface area of the following cubes and prisms. $SA = 2(wl + hl + hw)$

3. $SA =$ _____

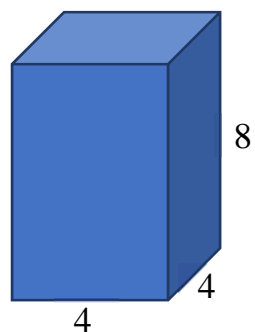


Find the surface area of the following prisms. $SA = 2(wl + hl + hw)$

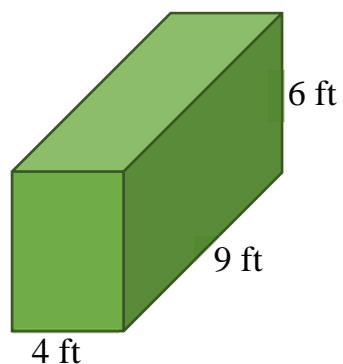
4. $SA =$ _____



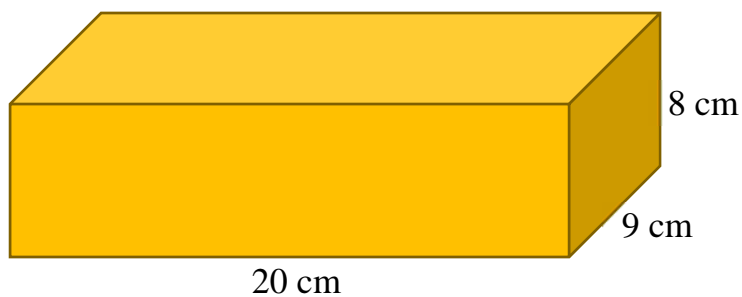
5. $SA =$ _____



6. $SA =$ _____

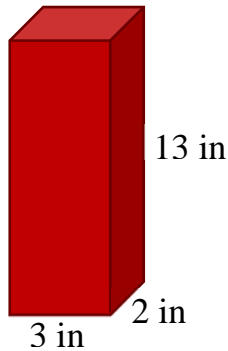


7. $SA =$ _____



Find the surface area of the following prisms. $SA = 2(wl + hl + hw)$

8. $SA =$ _____



Read the question and choose the best answer.

9.

- I. The floor of a room is a rectangle that is 10 feet wide and 13 feet long. Angel is going to paint only the 8.5 feet tall walls. If the doors and the window have a combined area of 55 square feet, how many square feet will Angel paint?

A 391 square feet C 336 square feet
B 110 square feet D 466 square feet

- II. Charlotte wants to wrap a present in a box for Luke. The top and bottom of the box are 8 inches by 4 inches, the sides are both 4 inches by 2 inches, and the front and back are 8 inches by 2 inches. How much wrapping paper will Charlotte need to wrap the present?

A 54 inches² C 112 inches²
B 108 inches² D 96 inches²

10. Surface Area of a Cube $SA = 6s^2$

- a. What is the surface area of the cube if the sides are 4 units?

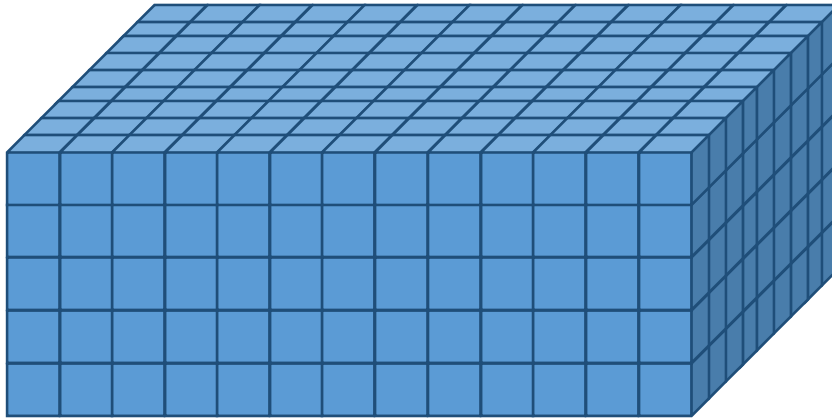
- b. The surface area of a cube is 294 square feet. What is the side length?

- c. The surface area of a cube is 486 centimeters². What is the side length?

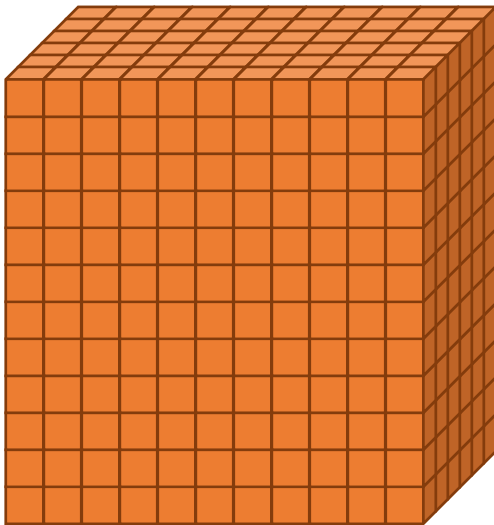
7.GM.1.1 Using a variety of tools and strategies, develop the concept that surface area of a rectangular prism with rational-valued edge lengths can be found by wrapping the figure with same-sized square units without gaps or overlap. Use appropriate measurements such as cm^2 .

Find the surface area of the following prisms. $SA = 2(wl + hl + hw)$

1. $SA =$ _____

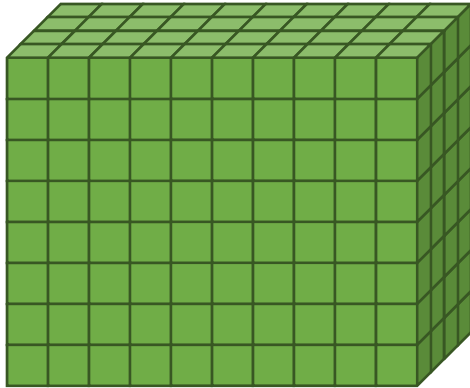


2. $SA =$ _____



Independent Practice (7.GM.1.1)

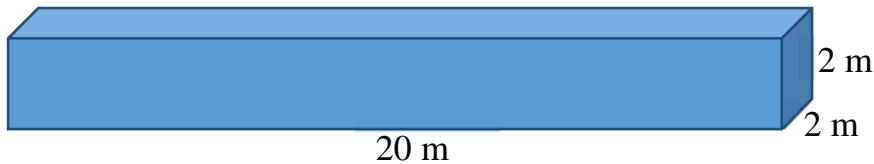
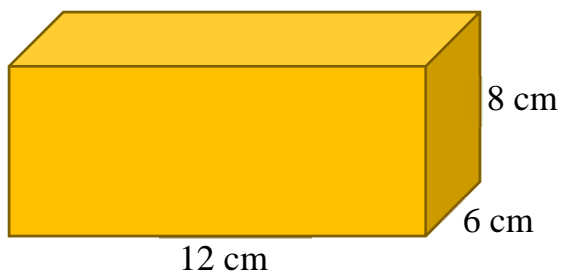
Name _____

Find the surface area of the following prisms. $SA = 2(wl + hl + hw)$ 3. $SA =$ _____*Given the surface area, what is the length of the cube's edge? $SA = 6s^2$*

4. The surface area of a cube is 54 square units.

5. The surface area of a cube is 600 square units.

6. The surface area of a cube is 150 square units.

7. $SA =$ _____8. $SA =$ _____

Solve.

9. A company is deciding which box to use for their merchandise. The first box measures 8 inches by 6.25 inches by 10.5 inches. The second box measures 9 inches by 5.5 inches by 11.75 inches. Which box required more material to make? Round to the nearest hundredths. $SA = 2(wl + hl + hw)$

10. Gage bakes a rectangular cake that is 9 inches wide, 13 inches long and 2 inches high. He removes the cake from the pan to frost it. How many square inches of frosting does he need? $SA = 2(wl + hl + hw)$

Circle the best answer.

11. A box the shape of a cube has edge lengths of 5 inches. What is the surface area of the box?
- A 25 inches²
B 50 inches²
C 125 inches²
D 150 inches²

Find surface area. $SA = 2(wl + hl + hw)$

12. Find the surface area of a rectangular prism with measures of 12 feet by 5 feet by 3 feet.

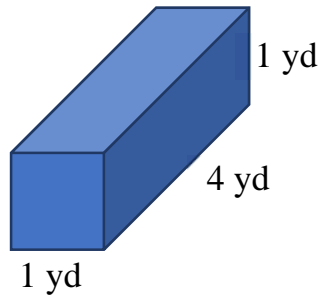
13. What is the surface area of a rectangular prism with a length of 6 centimeters, a height of 2 centimeters, and a width of 2 centimeters?

Independent Practice (7.GM.1.1)

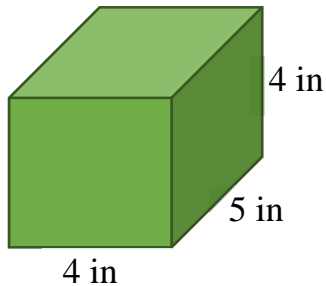
Name _____

Find surface area. $SA = 2(wl + hl + hw)$

14. What is the surface area?



15. What is the surface area?



Given the length, what is the cube's surface area? $SA = 6s^2$

16. What is the surface area of a cube with edge lengths of 10 meters?

Choose the best answer.

17. Which of the following would be used to measure surface area?

- A inches
- B inches²
- C inches³
- D inches⁴

Choose the best answer.

18. Which of the following would **not** be used to measure surface area?

- A cm^2
- B mm^2
- C m
- D square inches

Find surface area. $SA = 2(wl + hl + hw)$

19. Find the surface area of a rectangular prism with edge lengths of 2.6 units, 3.7 units, and 4.9 units.

20. Nicole bought a gift for her friend. She wants to put the gift in a package with a length of 9 inches, width of 12 inches, and height of 4 inches. What is the surface area of the package?

Evaluate.

1. $(9 \times 5 - 8^2) + 9 = \underline{\hspace{2cm}}$

2. $(44 - 4^2) \div (-5 + 7) = \underline{\hspace{2cm}}$

3. You went on a trip with your parents. They drove 7 hours at 72 miles per hour.
-
- How many miles did you travel?
- $(d = rt)$

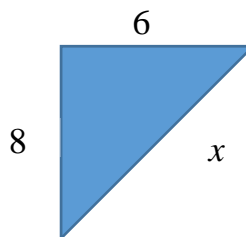
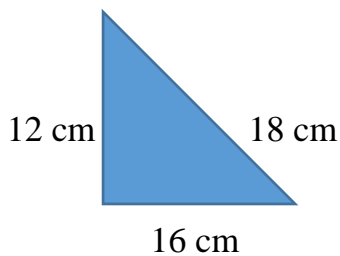
4. Solve for x : $\frac{3}{x} = \frac{81}{135}$

Solve and graph the solution set for the following inequality.

5. $32 + x < 8$

*Solve.*

6. Identify the corresponding sides and use ratios to determine whether the triangles are similar. If so, find the length of
- x
- .



Choose the best answer.

7. Which equation matches the data in the box?

A $y = 3x + 3$

B $y = 3x$

C $y = \frac{1}{3}x$

D $y = \frac{1}{3}x + 3$

x	y
0	0
1	3
2	6

8. Which inequality matches the following graph?



A $x + 3 < 7$

B $x + 3 \leq 7$

C $x + 3 > 7$

D $x + 3 \geq 7$

Solve.

9. Paige and three friends went to the movies. The total for four tickets was \$30.
Write an equation to determine the cost of each ticket.

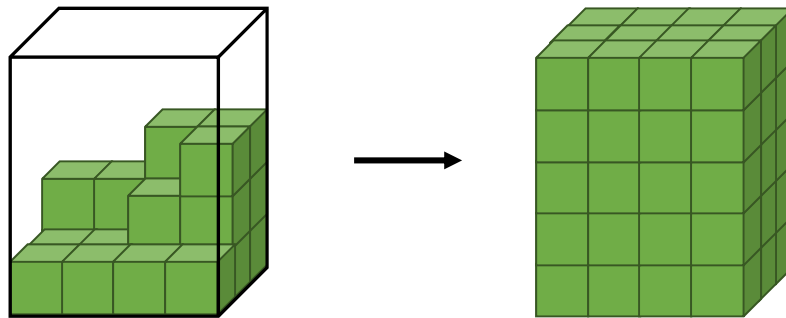
10. Evaluate using the distributive property.

$$-7(3n + 5)$$


7.GM.1.2 Using a variety of tools and strategies, develop the concept that the volume of rectangular prisms with rational-valued edge lengths can be found by counting the total number of same-sized unit cubes that fill a shape without gaps or overlaps. Use appropriate measurements such as cm^3 .

Real-World Connections

Volume is a measurement of the amount of space in a three-dimensional shape. You need to know how to calculate volume to fill a pool or fish tank with water or to fill the space of a container. You can calculate volume using the length x width x height. The result is the total number of same-sized unit cubes that fill a shape without gaps or overlaps.



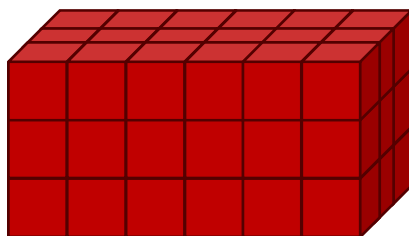
Vocabulary

volume	a measurement of the amount of space within a closed three-dimensional shape. Ex: $V = lwh$
same sized unit cubes	same unit, a determinate quantity as a standard of measurement of a cube, the regular solid of six equal square sides; ex. 1 unit cube 
cm^3	a cm raised to the third power which is indicated by a small 3 to its upper-right

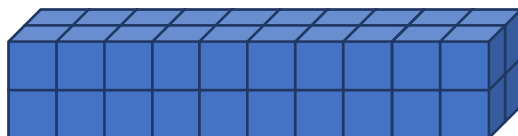
Find the volume.

1. Find the volume (units³).

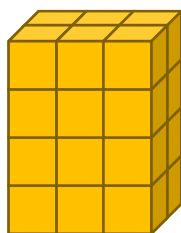
A _____



B _____

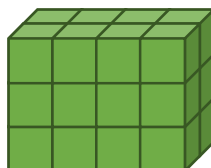


C _____

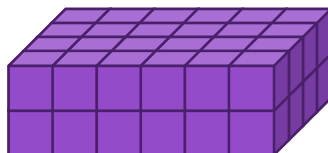


2. Evaluate the volume of the rectangular prism. $V = lwh$

A _____



B _____



Find the volume.

3. Length = 6 feet; Height = 8 feet; Width = 10 feet. Find the volume of the rectangular prism. Volume = _____
4. What is the volume of a rectangular box with dimensions 2.1 feet \times 4 feet \times 5.5 feet? Volume = _____
5. Eighteen-wheeler travel trailers are rectangular prisms. The typical height for the inside of these trailers is 108 inches. If the trailer is 8 feet wide and 20 feet long, what is the volume of the trailer? _____
6. Which of the following units would be used to measure volume?
 - A feet
 - B feet³
 - C feet²
 - D None of the above
7. A rectangular prism is made of 8 cubes. The cubes measure one-third of a centimeter on each side. What is the volume of the rectangular prism?

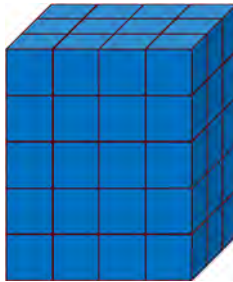
8. A rectangular prism is packed with cubes that have a side length of 1.6 inches. If a total of 45 cubes are used, what is the volume of the rectangular prism?

9. Which of the following units would be used to measure volume?
 - A meters⁴
 - B meters²
 - C meters
 - D None of the above
10. A rectangular prism is made of 80 cubes, each with a side length measure of $\frac{1}{4}$ of a yard. What is the volume of the rectangular prism?

7.GM.1.2 Using a variety of tools and strategies, develop the concept that the volume of rectangular prisms with rational-valued edge lengths can be found by counting the total number of same-sized unit cubes that fill a shape without gaps or overlaps. Use appropriate measurements such as cm^3 .

Evaluate the volume of the rectangular prism. $V = lwh$

1. $V =$ _____



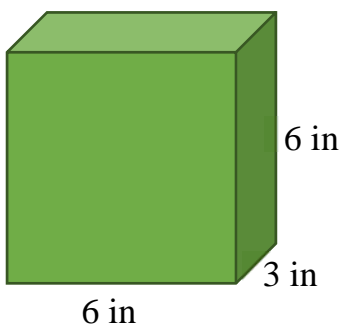
2. $V =$ _____



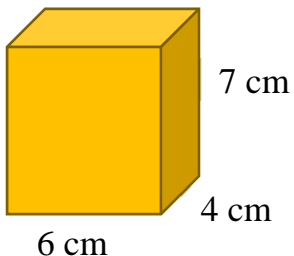
3. $V =$ _____



4. $V =$ _____

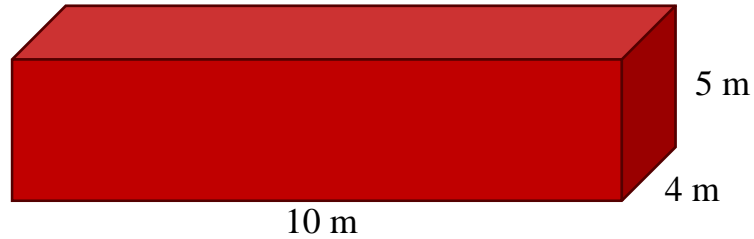


5. $V =$ _____



Find the volume.

6. $V =$ _____



7. $V =$ _____

Height = 2 units

Length = 5 units

Width = 6 units

8. $V =$ _____

Height = 11 meters

Length = 8 meters

Width = 3 meters

Use your knowledge of volume to answer each problem.

9. Lawton wants to add a community pool on the east side of town. When determining the budget, the Lawton City Council decided they would be able to install a wading pool that requires less than 15 cubic feet of water. The council had a choice from 3 different models of wading pools shown to them. Which choice is best for the wading pool? Why are the others not good choices?

A Choice One: 5 feet \times 5 feet \times 1 foot

B Choice Two: 4 feet \times 3 feet \times 1 foot

C Choice Three: 4 feet \times 2 feet \times 2 feet

10. Meagan is buying a large box from the post office to send a birthday gift to her grandmother in Enid, Oklahoma. The dimensions of the box are 18 inches \times 15.5 inches \times 14 inches. What is the volume of the largest gift she can send to her grandmother?

Use your knowledge of volume to answer each problem.

11. A box is in the shape of a cube. The box has edge lengths of 5 inches. How many unit cubes are needed to fill the box?

A 25 units³
B 50 units³
C 125 units³
D 150 units³

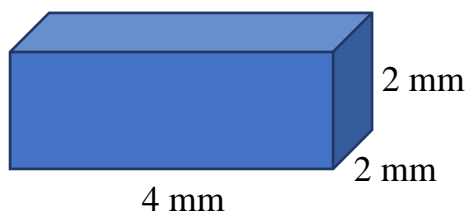
Find the volume.

12. A rectangular prism is made up of 32 cubes, each measuring $\frac{1}{4}$ of a foot per side. What is the volume of the rectangular prism?

13. Eighteen cubes are used to make a rectangular prism. What is the volume of the prism if each cube's side is $\frac{1}{3}$ of a centimeter?

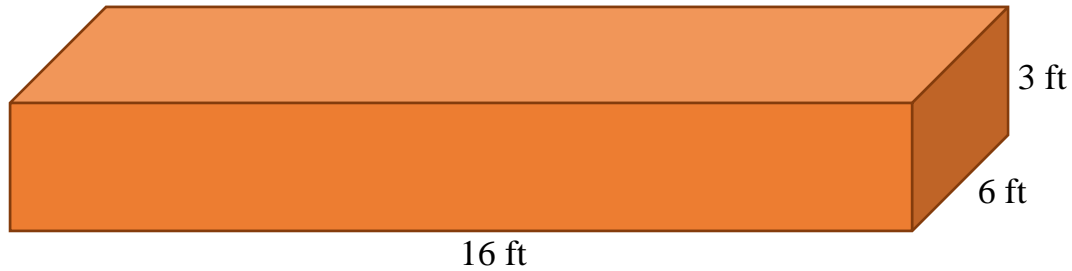
14. A rectangular prism is packed with cubes that have a side length of 0.7 inches. If a total of 60 cubes is used, what will be the volume of the rectangular prism?

15. What is the volume of this figure?



Use your knowledge of volume to answer each problem.

16. What is the volume of this figure?



17. Which of the following could be used to measure volume?

- A unit^3
- B cm^3
- C ft^3
- D All the above

18. What is the volume of a rectangular prism containing 96 cubes if each cube has a side length of $\frac{1}{2}$ an inch?

Find the volume.

19. Which of the following would be used to measure volume?

- A meters
- B cubic meters
- C square meters
- D All of the above

20. What is the volume of a cube with side lengths of 10 centimeters?

Evaluate

1. $\frac{52 - (8 \times 2 \div 4) + 3^2}{3} = \underline{\hspace{2cm}}$

2. $4^2 - 3 \times 2 \times \left(\frac{7}{3} \div \frac{7}{6}\right) = \underline{\hspace{2cm}}$

3. $(1 + 2)^2 \times (3 - 1)^2 \div 2 = \underline{\hspace{2cm}}$

4. $(-1) \times (-4) \div (-1) - (-7 + 9)^2 = \underline{\hspace{2cm}}$

Solve and graph the solution set for the following inequalities.

5. $5b \leq -10$



6. $\frac{x}{9} > 6$

*Convert the following ratios to their equivalent decimal and identify as terminating or repeating.*

7. $\frac{1}{7} = \underline{\hspace{2cm}} \quad \underline{\hspace{2cm}}$

8. $\frac{77}{600} = \underline{\hspace{2cm}} \quad \underline{\hspace{2cm}}$

Complete the table.

9. A movie theater has three sizes of popcorn boxes; small, medium and large.
Complete the chart below.

Size	Length	Height	Width	Surface Area	Volume
Large	8 inches	7 inches	8 inches		
Medium	6 inches	5 inches	8 inches		
Small	4 inches	3 inches	8 inches		

Compare using $>$, $<$, or $=$.

10. $\frac{3}{5}$ 0.651

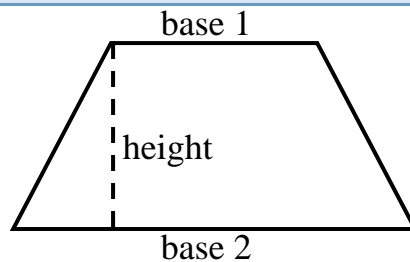
7.GM.2.1 Develop and use the formula to determine the area of a trapezoid to solve problems.

Real-World Connections

A trapezoid is a quadrilateral, four-sided closed figure, only having two parallel sides. In the real-world, you see trapezoids in many places. Trapezoids make up the frames of bicycles, some purses, counter and table tops, many architectural designs of buildings and windows, and the trusses of bridges. Think of where you might have seen them. Today, you will develop and use the formula to determine the area of a trapezoid to solve problems.

Vocabulary

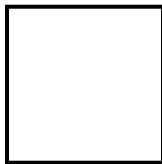
area	a measure of the amount of space within a closed two-dimensional shape
area of a trapezoid	the sum of its bases multiplied by the height of the trapezoid and divided by 2; area is measured in square units
trapezoid	a quadrilateral only having two parallel sides



Identify the formula to calculate area of each of the following shapes.

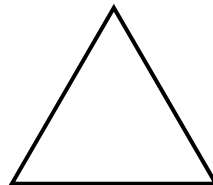
1.

a.



A = _____

b.



A = _____

c.

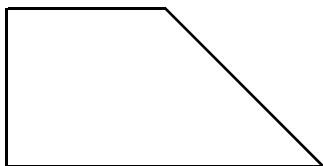


A = _____

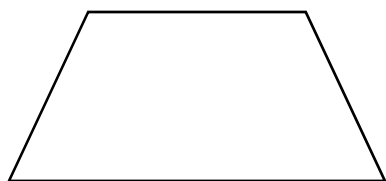
2. What do you see? Record observations and inferences about area formulas.

Identify regular and isosceles trapezoids.

3.

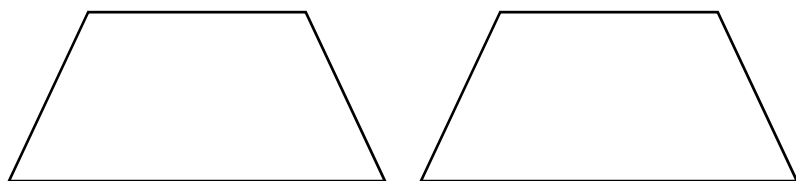


4.



Divide trapezoids to determine area.

5.

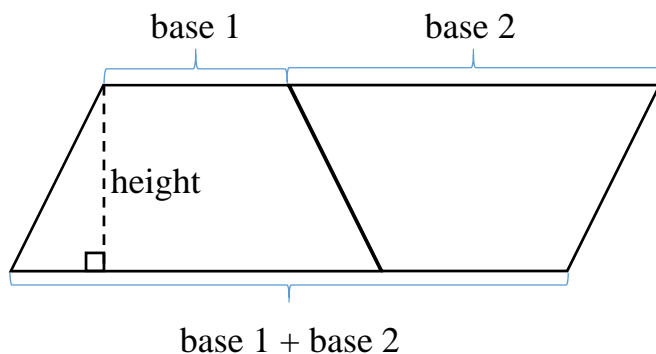


6. Record observations and write area formulas:

A = _____

Or

A = _____

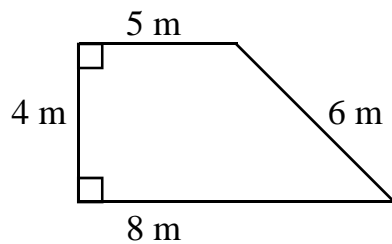


Guided Practice (7.GM.2.1)

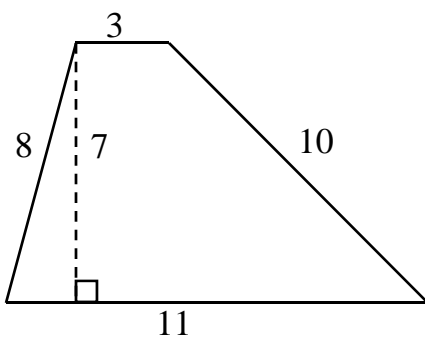
Name _____

Determine the area of a trapezoid.

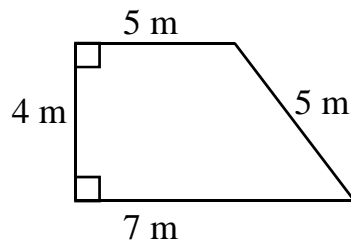
7. $A =$ _____



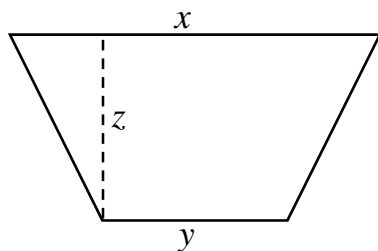
8. $A =$ _____



9. $A =$ _____



10. If $x = 13$ centimeters, $y = 5$ centimeters, and $z = 6$ centimeters, what is the area of the trapezoid?

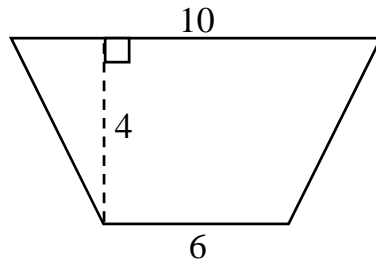


$A =$ _____

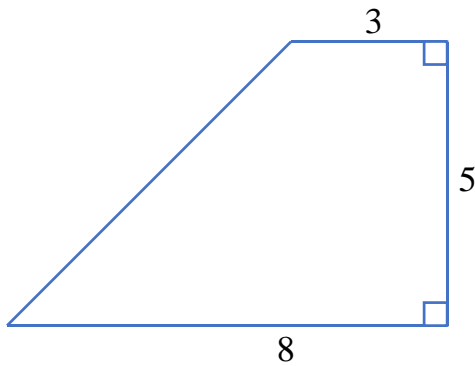
7.GM.2.1 Develop and use the formula to determine the area of a trapezoid to solve problems.

Determine the area of a trapezoid. $\text{Area} = \frac{b_1 + b_2}{2} h$ or $\frac{1}{2} h (b_1 + b_2)$

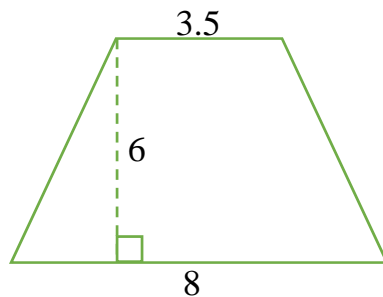
1. $A =$ _____



2. $A =$ _____



3. $A =$ _____

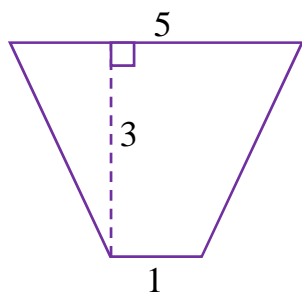


Independent Practice (7.GM.2.1)

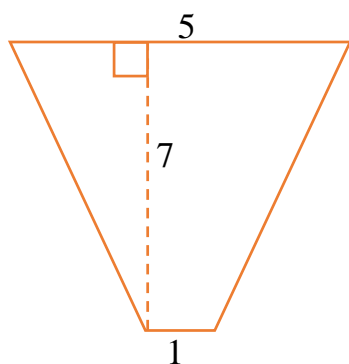
Name _____

Determine the area of a trapezoid. $\text{Area} = \frac{b_1 + b_2}{2} h$ or $\frac{1}{2} h (b_1 + b_2)$

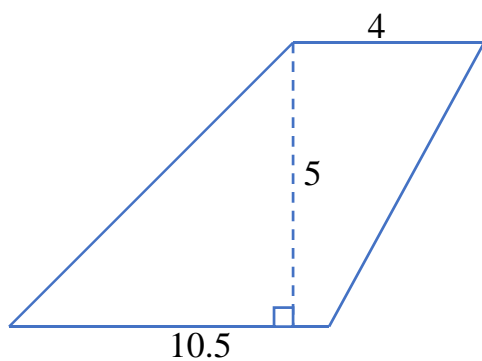
4. $A =$ _____



5. $A =$ _____



6. $A =$ _____



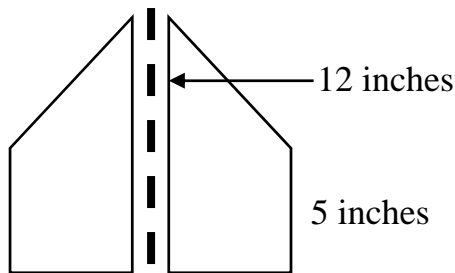
Determine the area of a trapezoid. $\text{Area} = \frac{b_1 + b_2}{2} h$ or $\frac{1}{2} h (b_1 + b_2)$

7. Find the area of a trapezoid with bases of 10 inches and 14 inches, and a height of 5 inches.

8. Find the area of a trapezoid with bases of 9 centimeters and 7 centimeters, and a height of 3 centimeters.

Solve.

9. Leo is making a get-well card for his mother. See the shape of the card is below. The total area of the card is 102 inches². What is the height of the card?

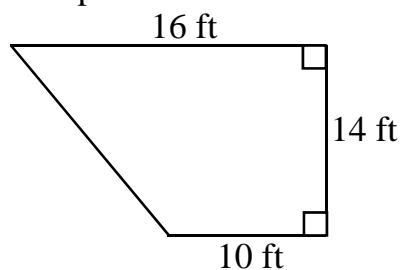


10. Pam drew a trapezoid on the sidewalk with the bases of 20 inches and 10 inches. The height was 22 inches. What is the area, in square inches (in²), of Pam's drawing?

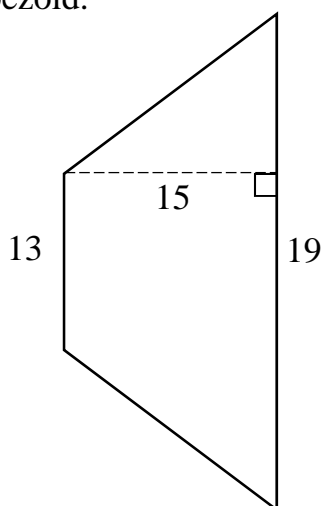
11. Determine the area of a trapezoid if the height is 5 units and the bases are 16 units and 8 units.

Determine the area of a trapezoid. $\text{Area} = \frac{b_1 + b_2}{2} h$ or $\frac{1}{2} h (b_1 + b_2)$

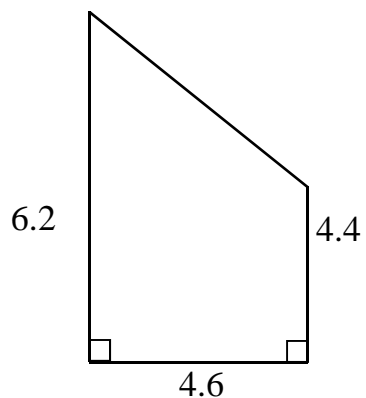
12. Find the area of the trapezoid.



13. Find the area of the trapezoid.



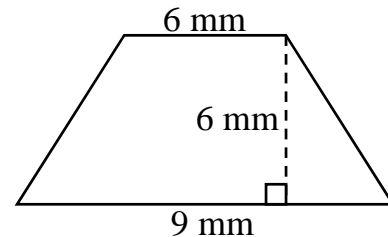
14. Find the area of the trapezoid. Round to the nearest tenth.



Determine the area of a trapezoid. $\text{Area} = \frac{b_1 + b_2}{2} h$ or $\frac{1}{2} h (b_1 + b_2)$

Solve.

15. Addison says if you double the dimensions of the trapezoid below, its area doubles. Do you agree? Explain your answer.

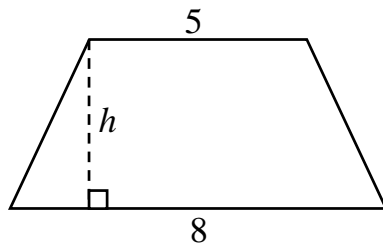


16. A trapezoid has an area of 50 square centimeters. The lengths of the bases are 10 centimeters and 15 centimeters. Find the height.

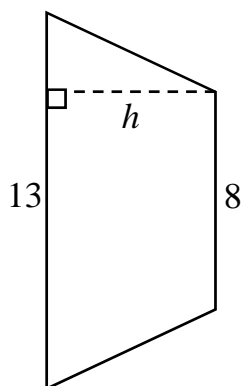
17. A trapezoid has an area of 24 square inches. The height is 3 inches, and the length of one of the bases is 5 inches. Find the length of the other base.

For questions 18-20, match the trapezoid with the equation used to find the height.

18. ____



19. ____



Formula choices:

A $\frac{1}{2}h(8 + 13)$

B $\frac{1}{2}h(5 + 13)$

C $\frac{1}{2}h(5 + 8)$

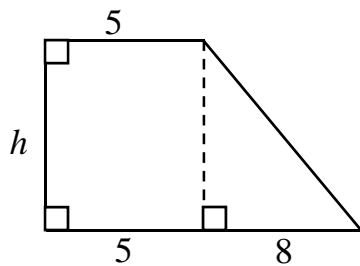
D $\frac{1}{2}h(5 + 5)$

Independent Practice (7.GM.2.1)

Name _____

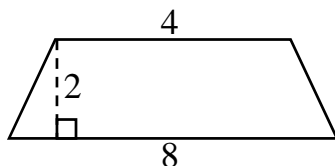
Determine the area of a trapezoid. Area = $\frac{b_1 + b_2}{2} h$ or $\frac{1}{2} h (b_1 + b_2)$

20. ____



Determine the area of a trapezoid. Area = $\frac{b_1 + b_2}{2} h$ or $\frac{1}{2} h (b_1 + b_2)$

1. A = _____

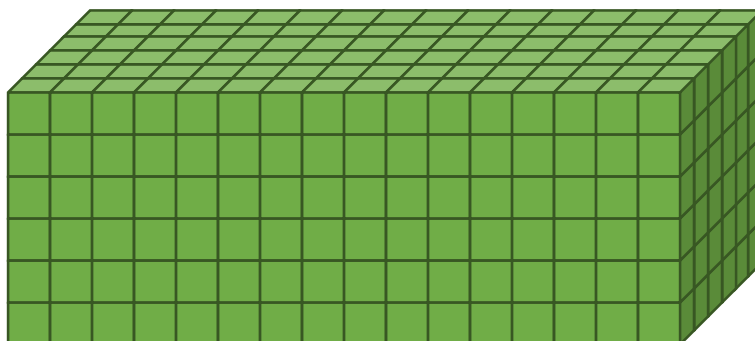


2. Complete the following table.

Fraction	Equivalent Fraction	Decimal	Percent
$\frac{5}{25}$			

Use your knowledge of volume and surface area to answer each problem.

$V = lwh$ and $SA = 2(wl + hl + hw)$



3. SA = _____

4. V = _____

Estimate the following product or quotient:

5. $\frac{89}{9} \approx$ _____

6. $391(4) \approx$ _____

Read to answer questions 7-9:

A cereal company wants to change the shape of its cereal box to attract the attention of shoppers. The original cereal box has dimensions of 9 inches \times 3 inches \times 11 inches. The newly designed cereal box would have dimensions of 7 inches \times 4 inches \times 11 inches.

7. Which box holds more cereal?

8. Which box requires more material to make?

9. Which box should the company use? Explain why and support your answer with volume and surface area evidence.

Simplify the following absolute value problem.

10. $|33| \div -|3| = \underline{\hspace{2cm}}$

7.GM.2.2 Find the area and perimeter of composite figures to solve real world and mathematical problems.

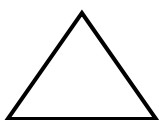
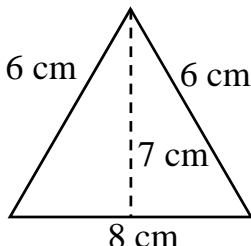
Real-World Connections

The ability to calculate perimeter and area can be very useful in everyday activities. The perimeter is the distance around an object. Think of building a fence in which to keep a dog. You must not have any gaps, or the dog will escape. Building a fence is only one example. Perimeter is also used to create the outline on football and baseball fields. The area is the amount of space within the outline. How much space will a new pool, house, or couch need? However, objects are rarely perfect rectangles, squares or triangles. They are made up of several shapes called composite figures. Today, you will look at composite figures and break them into smaller parts to calculate perimeter and area.

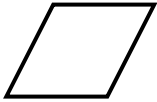
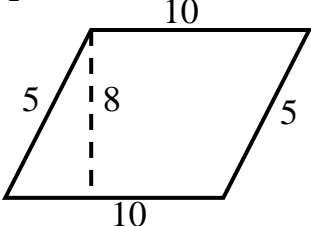

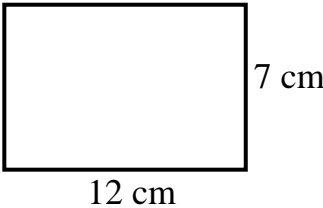

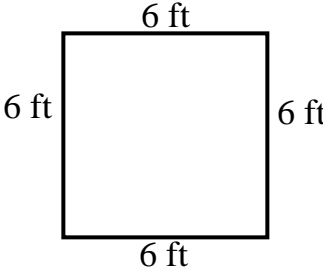
Vocabulary

perimeter	the total length of all the edges of a polygon; often, perimeter is thought of as the distance around an object, traversed once along the edges starting from one vertex and ending at the same vertex
composite figures	a shape composed of a combination of other shapes; composite figures are often split into their component shapes to calculate area

1. Complete the chart with area formulas for each of the figures below. Calculate the perimeter for each figure.

Solid Shape	Name	Area Formula	Area (units ²)	Perimeter (units)
	Triangle		$b = 8 \text{ cm}$ $h = 7 \text{ cm}$ $A =$	$P =$ 

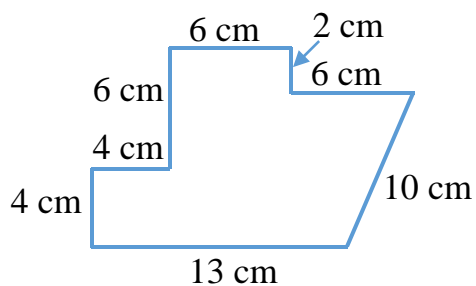
1. (Continued) Complete the chart with area formulas for each of the figures below. Calculate the perimeter for each figure.

Solid Shape	Name	Area Formula	Area (units ²)	Perimeter (units)
	Parallelogram		$b = 10 \text{ cm}$ $h = 8 \text{ cm}$ $A =$	$P =$ 
	Rectangle		$b = 12 \text{ cm}$ $w = 7 \text{ cm}$ $A =$	$P =$ 
	Square		$s = 6 \text{ ft}$ $A =$	$P =$ 

Find the area and perimeter of each composite figure.

2. $P =$ _____

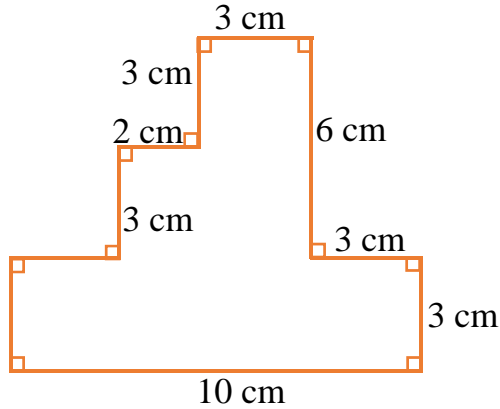
$A =$ _____



Find the area and perimeter of each composite figure.

3. P = _____

A = _____

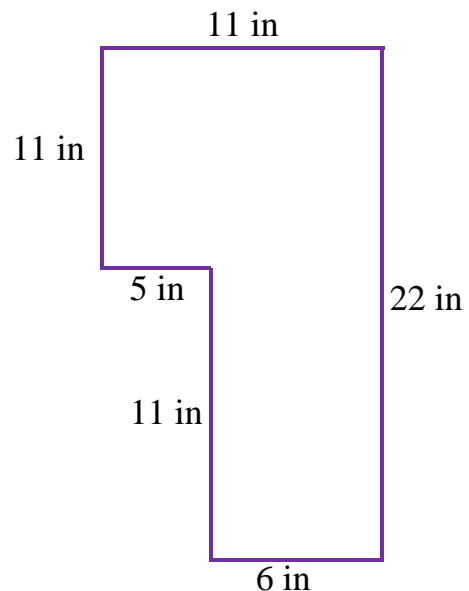


4. Lori is shopping for a new rug and finds a very large square area rug. Two diagonal lines divide the square into four congruent triangles. The base of each triangle is 10 feet and the height is 5 feet. What is the area of the entire area rug? What is the perimeter?

5. Trace needs new carpet for her house. The living area is an open floor plan of a dining room 6 feet \times 4 feet, sitting area 10 feet \times 15 feet, and a breakfast nook 5 feet \times 5 feet. How many square feet of carpet does she need?

6. What is the perimeter of the figure?

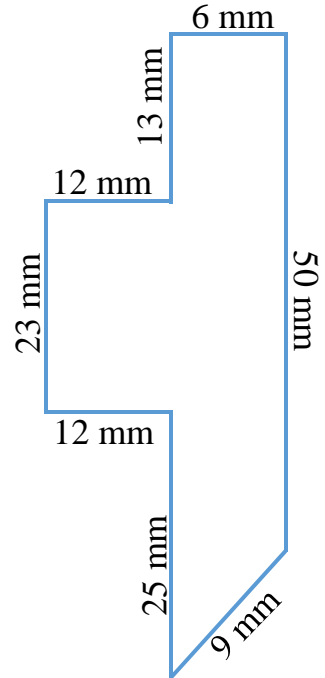
7. What is the area of the figure in question 6?



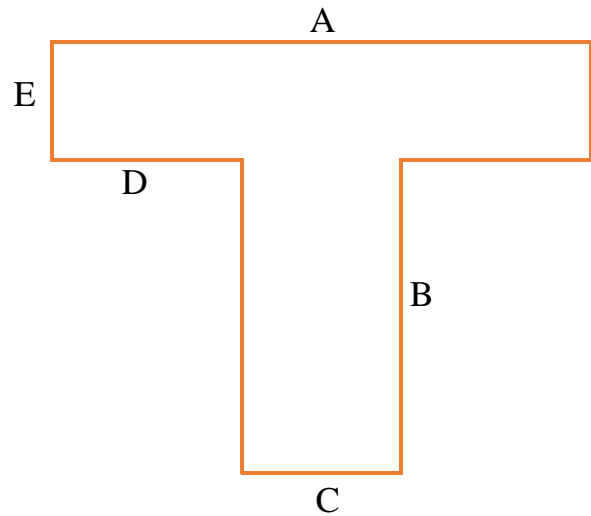
Find the area and perimeter of each composite figure.

8. What is the perimeter of the figure?

9. What is the area of the figure in question 8?



10. If $A = 10$ feet, $B = 11$ feet, $C = 3$ feet, $D = 4$ feet, and $E = 1$ foot, what is the perimeter of the object?

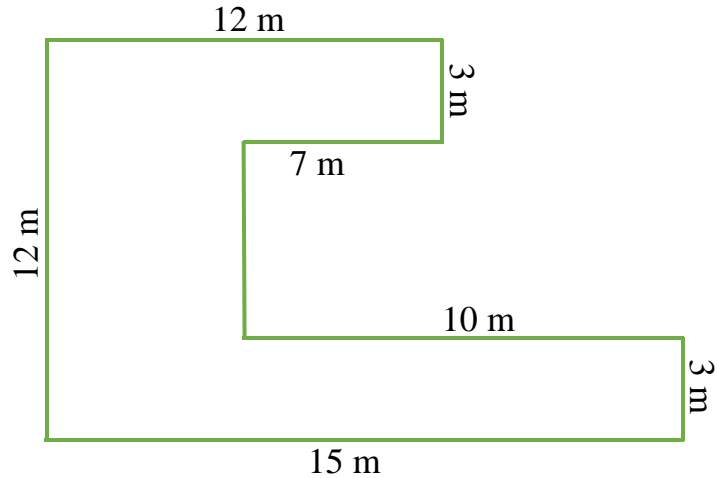


7.GM.2.2 Find the area and perimeter of composite figures to solve real world and mathematical problems.

Find the area and perimeter of each composite figure.

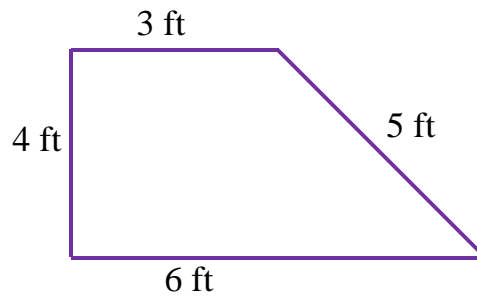
1. $P =$ _____

2. $A =$ _____



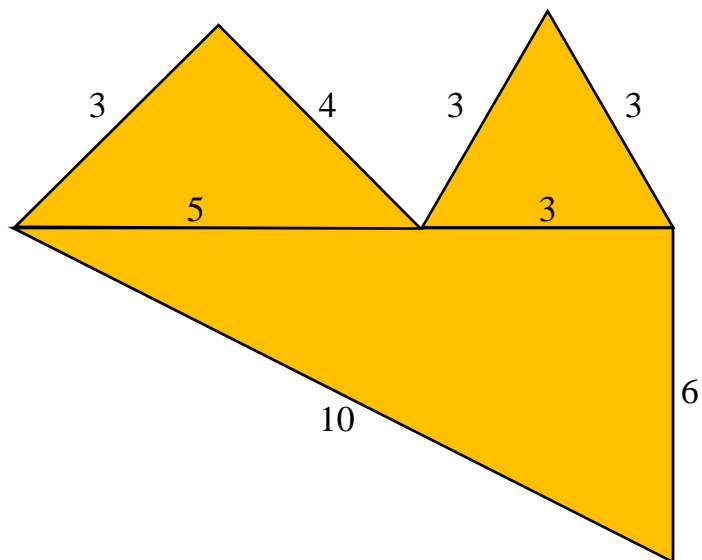
3. $P =$ _____

4. $A =$ _____



5. $P =$ _____

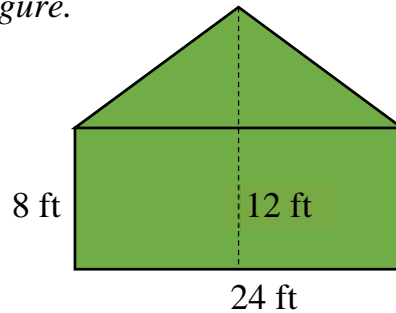
6. $A =$ _____



Find the area and perimeter of each composite figure.

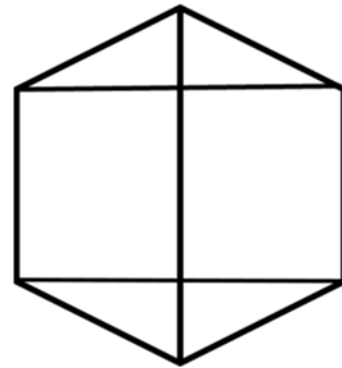
7. $P =$ _____

8. $A =$ _____



Solve.

9. If cell phone towers are arranged 10 miles apart in a hexagon pattern with towers on the vertices as shown. What is the perimeter of this section's cell coverage?



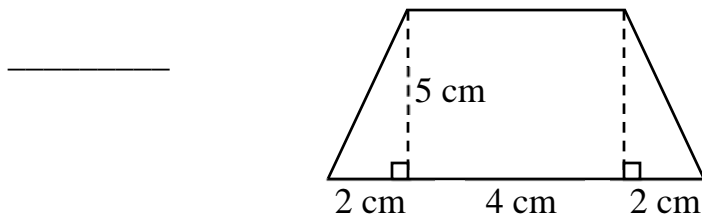
10. Libby has a beautiful garden. There are several sections of vegetables. Corn on the cob $32 \text{ feet} \times 8 \text{ feet}$, tomatoes $10 \text{ feet} \times 24 \text{ feet}$, carrots $8 \text{ feet} \times 24 \text{ feet}$, radishes $4 \text{ feet} \times 24 \text{ feet}$, onions $6 \text{ feet} \times 24 \text{ feet}$, and okra $4 \text{ feet} \times 24 \text{ feet}$. She wants to add squash and zucchini which need another $32 \text{ feet} \times 8 \text{ feet}$. She has 1,400 square feet available for her garden. Does she have enough land for her garden this year? Use the diagram below to calculate the perimeter of her fence to keep the rabbits out.

32×8 Corn	10×24 tomatoes	32×8 squash and zucchini
	8×24 carrots	
	4×24 radishes	
	6×24 onions	
	4×24 okra	

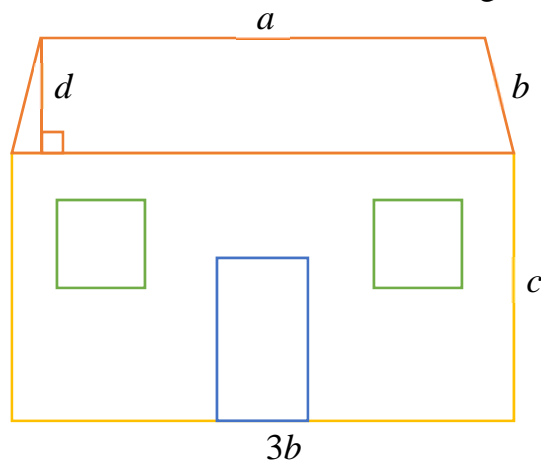
**illustration may not be in proportion*

Find the area and perimeter of each composite figure.

11. What is the area of this figure?



12. Clair drew a house for her art class. The drawing is shown below.



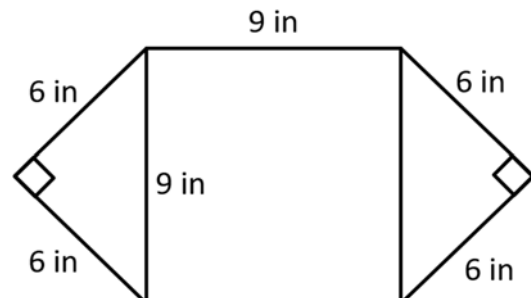
If $a = 5$ inches, $b = 1.5$ inches, $c = 10$ inches, and $d = 2$ inches, what is the perimeter of the house drawing?

13. What is the area of the house drawing in question 12?

14. This figure shows the placemat Kendall made using two square pieces of paper measured in inches. She cut one piece in half.

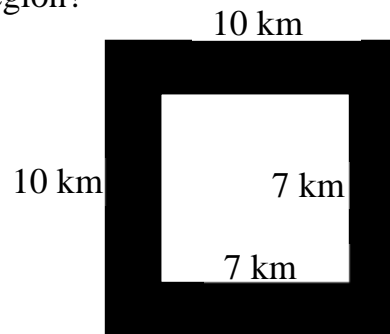
What is the area of Kendall's placemat?

- A 42 inches²
 B 54 inches²
 C 99 inches²
 D 117 inches²



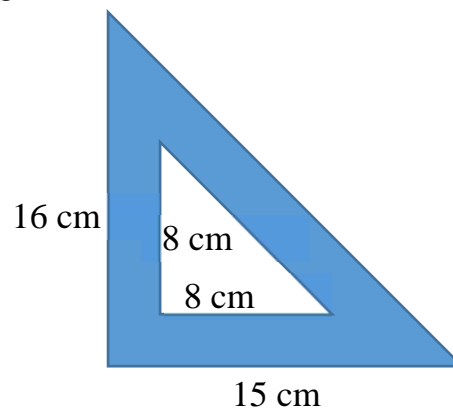
Find the area and perimeter of each composite figure.

15. What is the area of the shaded region?

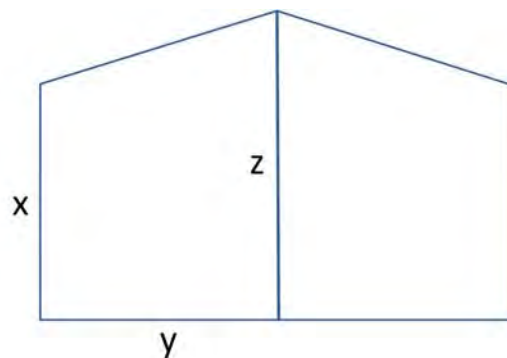


16. What is the perimeter of the shaded region of the figure in question 15?

17. What is the area of the shaded region?

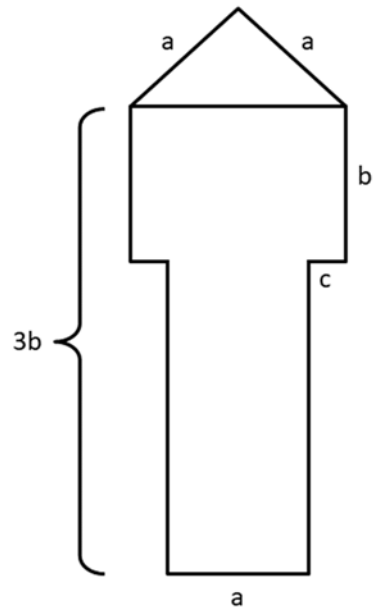


18. If $x = 24$ meters, $y = 34$ meters, and $z = 36$ meters, what is the area of the entire region?

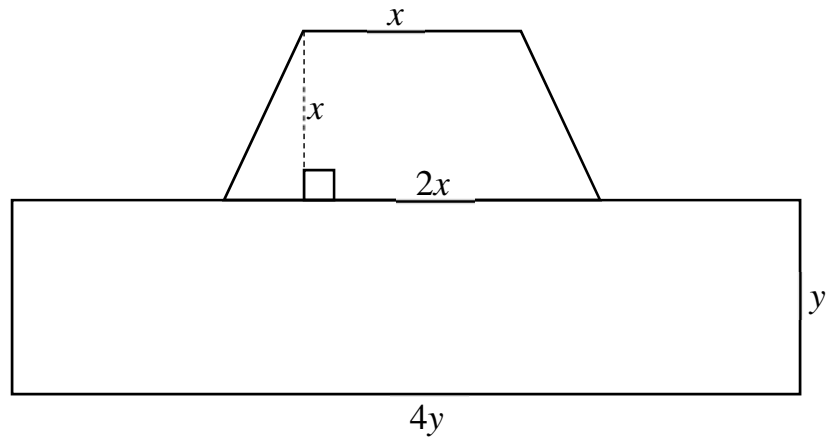


Find the area and perimeter of each composite figure.

19. If $a = 2$ inches, $b = 6$ inches, and $c = 1$ inch, what is the perimeter of the drawing?



20. If $x = 3$ yards and $y = 2$ yards, what is the area of the entire region?



Solve.

1. Use counters to represent the division problem.

$$\text{Blue circle with } + = +1 \quad \text{Orange circle with } - = -1$$

$$-15 \div 3 =$$

2. Payton bought 6 equal sized snow cones for her group of friends. If she spent \$9.78 for all six snow cones, how much did each snow cone cost?

3. Evaluate.

$$(-7)^3 = \underline{\hspace{2cm}}$$

4. Solve $10^0 + 10^2 =$ _____

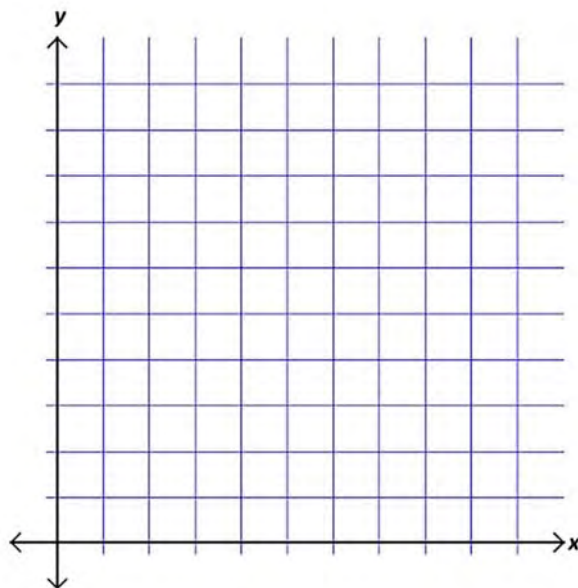
5. Give two expressions that each have absolute values equal to 15.

6. y is inversely proportional to x , and $y = 60$ when $x = 6$. What is the value of y when $x = 4$? What is the value of y when $x = 12$?

Graph the line that passes through the coordinates in the table, and tell whether the graph is proportional or not. Explain

7.

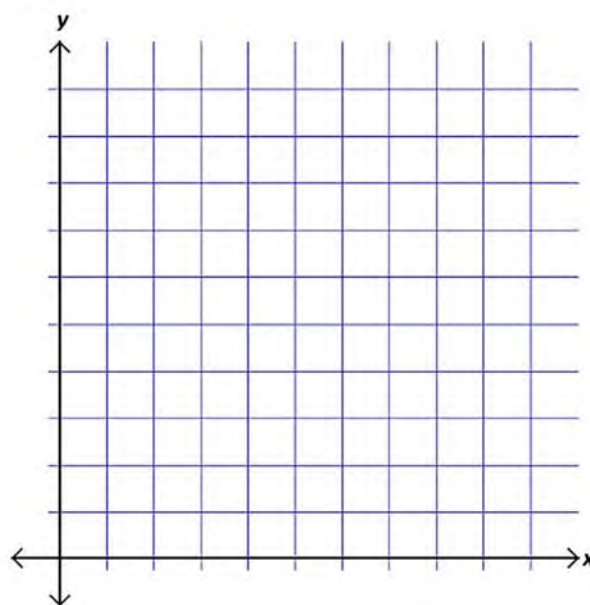
x	y
0	0
1	4
2	8



For the relationship below, complete the table to show how the two quantities vary. Graph them on the coordinate plane, and describe the unit rate or slope.

8. Leslie works 60 math problems in 2 hours.

$x =$ hours	$y =$ math problems
1	
2	
3	



Solve.

9. In Mrs. Jones' 7th grade class, 26 out of 40 students have computers at home. If there are 600 students total in 7th grade, how many students would you expect to have a home computer?

10. The 7th grade class is going on a zoo field trip. The students wanted to know how many miles the zoo was from the school. They looked at a map and found a scale showing 1 inch = 22 miles. How many miles is the zoo from their school if they measured 1.5 inches total on the map?

7.GM.3.1 Demonstrate an understanding of the proportional relationship between the diameter and circumference of a circle and that the unit rate (constant of proportionality) is π and can be approximated by rational numbers such as $\frac{22}{7}$ and 3.14.

Real-World Connections

Think of all the circles around you such as, swimming pools, tables, trees, roof vents, and clothing such as skirts. How do you measure these circles? You use the mathematical terms of circumference, diameter, and π to calculate these measurements. Today, you are going to develop and understand the proportional relationship between the diameter and circumference of a circle and the unit rate (constant of proportionality) is π and can be approximated by rational numbers such as $\frac{22}{7}$ and 3.14. Once you understand this concept you will be able to solve for area and circumference of a circle.

Vocabulary

diameter of a circle	a straight-line segment passing through the center of the circle and terminating on the circle
circumference of a circle	the length of the circle if cut and opened to make a straight-line segment, which can be found with $C = 2\pi r$ where r is the radius and π is the irrational number “pi” (approximately 3.14 or $\frac{22}{7}$)
circle	the set of all points that are equidistant from a given point, called the center of the circle; the set of all points that lie inside the circle is called the interior of the circle
π (pi)	the irrational number that is the ratio of the circumference to the diameter of a circle; for computational purposes, 3.14 or $\frac{22}{7}$ is frequently used as an approximation of π .

1. *Using the word bank below, draw a circle and label the parts of a circle.*

Parts:

Diameter

Radius

Chord

Point/Center

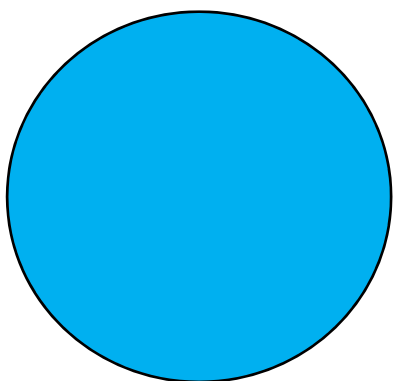
2. *Select your own circular items. Complete the chart below with circumference and diameter of each item.*

Item	Measuring Tool	Circumference	Diameter	$\frac{\text{Circumference}}{\text{Diameter}}$
a.				
b.				
c.				

3. What do you notice about dividing the circumference by the diameter?

Use a string and ruler to measure the circles provided below.

4.

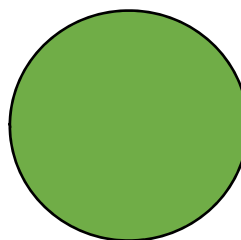


d = _____ in

C = _____ in

$\frac{C}{d}$ = _____ in

5.



d = _____ cm

C = _____ cm

$\frac{C}{d}$ = _____ cm

Read and answer the following questions.

6. Compare the chart information to the results of the given circles in Guided Practice #4 and #5.

7. If a circle has a radius of 3 centimeters, what is its circumference? Use 3.14 for pi.

Choose the best answer.

8. Sally rode on a Ferris wheel at the county fair. The diameter of the Ferris wheel was 206 feet. What is the approximate distance Sally traveled in one revolution of the Ferris wheel? Use 3.14 for pi.

- A 323.42 feet
- B 1293.68 feet
- C 33,312.26 feet
- D 646.84 feet

Choose the best answer.

9. What is the definition of pi (π)?
- A. The ratio between the area and the diameter of a circle
 - B. The ratio between the radius and the diameter of a circle
 - C. The ratio between the circumference and the area of a circle
 - D. The ratio between the circumference and the diameter of a circle

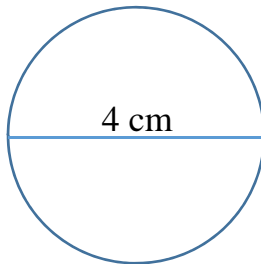
Find the circumference of the circle.

10. Find the circumference of a circle with a radius of 6 centimeters. Use $\frac{22}{7}$ for pi.

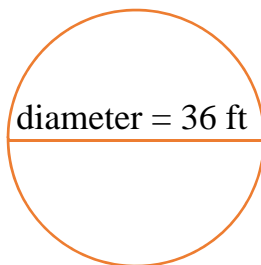
7.GM.3.1 Demonstrate an understanding of the proportional relationship between the diameter and circumference of a circle and that the unit rate (constant of proportionality) is π and can be approximated by rational numbers such as $\frac{22}{7}$ and 3.14.

Find the diameter given the radius or determine the radius given the diameter.

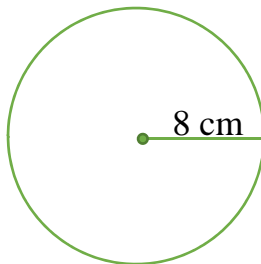
1. $r =$ _____



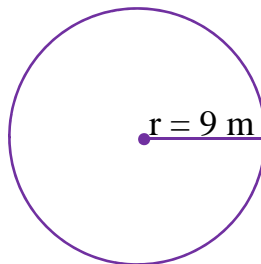
2. $r =$ _____



3. $d =$ _____



4. $d =$ _____



Independent Practice (7.GM.3.1)

Name _____

Find the radius and diameter given the circumference of a circle.

$$\left(\frac{C}{d} = 3.14 \text{ or } C = 3.14d\right)$$

5. $C = 12\pi$ yds $d = \underline{\hspace{2cm}}$ $r = \underline{\hspace{2cm}}$

6. $C = 36\pi$ cm $d = \underline{\hspace{2cm}}$ $r = \underline{\hspace{2cm}}$

7. $C = 108\pi$ in $d = \underline{\hspace{2cm}}$ $r = \underline{\hspace{2cm}}$

8. $C = 52\pi$ ft $d = \underline{\hspace{2cm}}$ $r = \underline{\hspace{2cm}}$

Read and answer the following questions.

9. What is the circumference of a Large 35 centimeters and an X-Large 40 centimeters pizza?

10. The distance around the wheel of a truck is 9.42 feet. What is the diameter of the wheel? Round to the nearest whole number.

11. The radius of a circle is 4 miles. What is the circle's circumference?

12. If the circumference of a circle is 31.4 centimeters, what is the circle's diameter?

13. If the diameter of a circle is 2 kilometers, what is the circle's circumference? Round your answer to the nearest tenth.

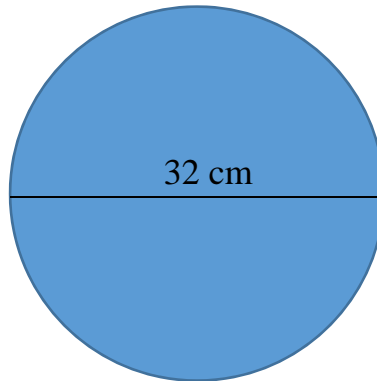
Circle the best answer.

14. What is the circumference of a circle with a radius of 7 inches?

- A 21π inches
- B 49π inches
- C 14π inches
- D 7π inches

Read and answer the following questions.

15. What is the circumference of this circle?



16. What is the radius of a circle when its diameter is 206.38 miles?

17. What is the radius of a circle when its circumference is 5.74π centimeters?

Independent Practice (7.GM.3.1)

Name _____

Read and answer the following questions.

18. The pizza shown has a circumference of 94.2 centimeters. What is the diameter of the pizza?



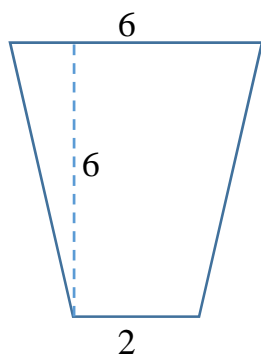
19. A circle of sunflowers is planted in the local park. Ben measured the circle and calculated its circumference to be 6.28 yards. What is the circle's radius?

20. A round parachute, when laid flat has a diameter of 10 meters. What is the parachute's circumference?

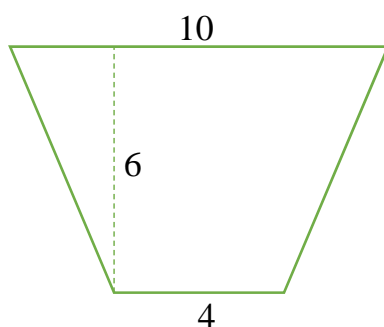
Evaluate the area of the following trapezoids.

$$\text{Area} = \frac{b_1 + b_2}{2} h \text{ or } \frac{1}{2} h (b_1 + b_2)$$

1. $A =$ _____



2. $A =$ _____

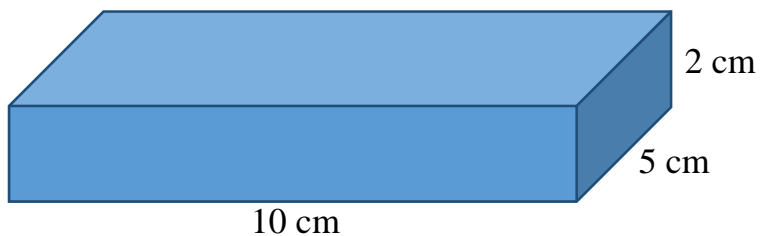


Use your knowledge of volume and surface area to answer each problem.

$$V = lwh \text{ and } SA = 2(wl + hl + hw)$$

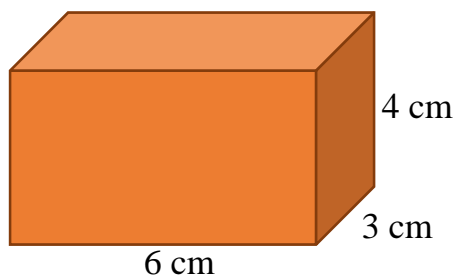
3. $SA =$ _____

4. $V =$ _____



5. $SA =$ _____

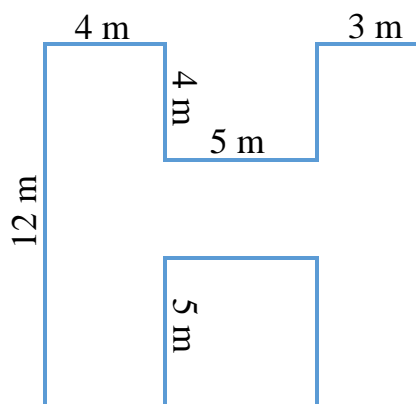
6. $V =$ _____



Evaluate the perimeter and area of the following composite figures.

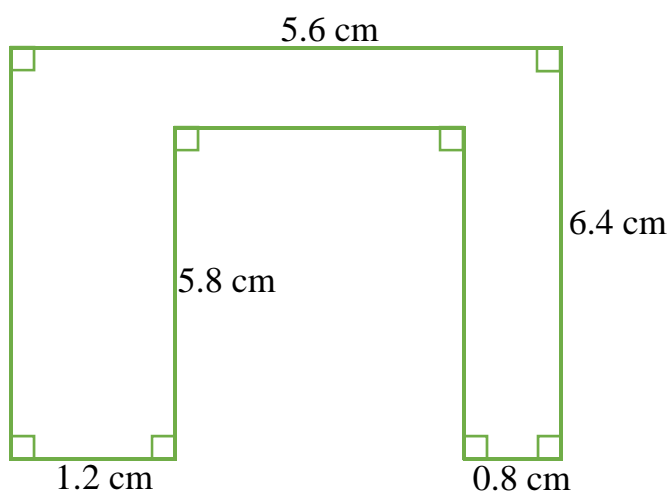
7. $A =$ _____

$P =$ _____



8. $A =$ _____

$P =$ _____



Read the problems below and evaluate.

9. The school has 5 buses that will hold 42 students each. If there are 195 students in the middle school, will there be enough buses to transport all the students? Explain.

10. If one-third of a number and 6 have a sum of 18, what is the number? Write an equation to solve for the number.

7.GM.3.2 Calculate the circumference and area of a circle to solve problems in various contexts, in terms and using approximations for π .

Real-World Connections

Previously, you may have thought of circles as swimming pools, tables, trees, roof vents and clothing such as skirts. You discussed how you measured these circles with circumference, the distance around the circle. You developed an understanding of the proportional relationship between the diameter and circumference of a circle and the unit rate (constant of proportionality) of π , approximated by rational numbers such as $\frac{22}{7}$ and 3.14. By the understanding this concept, you will be able to calculate the circumference and area of circles to solve problems in various contexts in terms and using approximations for π .

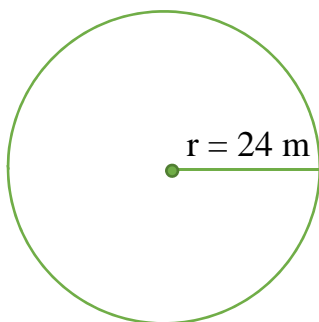
Vocabulary

calculate	to work something out, a mathematical operation
circumference of circles	the length of the circle if cut and opened to make a straight-line segment, which can be found with $C = \pi r$ where r is the radius and π is the irrational number “pi” (approximately 3.14 or $\frac{22}{7}$)
area of circles	the interior area of the circle, which can be found with $A = \pi r^2$ where r is the radius and π the irrational number “pi”
π (pi)	the irrational number that is derived by finding the ratio of the circumference to the diameter of a circle; this ratio is constant. Irrational numbers are important concepts and challenging to prove, so they often are arrived at empirically by students (approximately 3.14 or $\frac{22}{7}$)

1. Calculate the circumference of each circle in terms and using approximations for π . Round the answer to the tenth decimal place if needed. (Use $\pi = 3.14$) $C = \pi d$ or $C = 2\pi r$

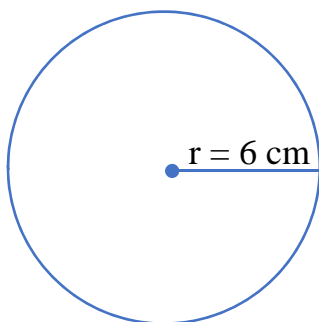
a. $C =$ _____

$C =$ _____



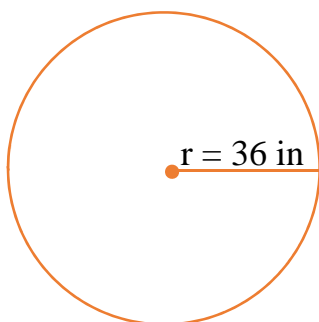
b. $C =$ _____

$C =$ _____



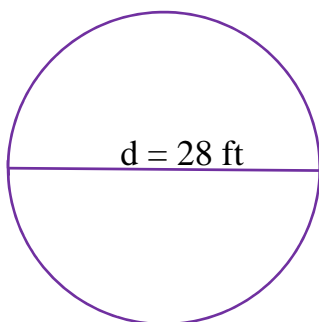
c. $C =$ _____

$C =$ _____



d. $C =$ _____

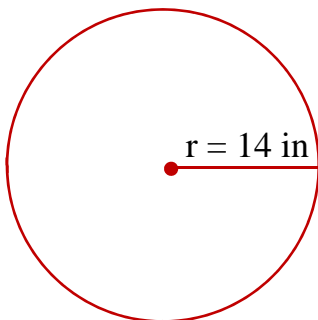
$C =$ _____



2. Calculate the area of each circle in terms and using approximations for π . Round the answer to the tenth decimal place. (Use $\pi = 3.14$) $A = \pi r^2$

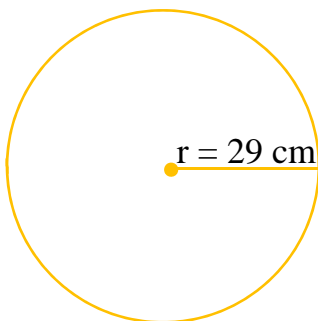
a. $A =$ _____

$A =$ _____



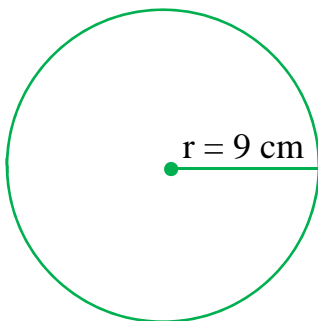
b. $A =$ _____

$A =$ _____



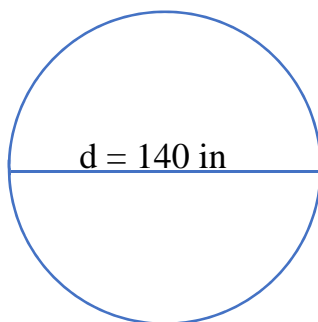
c. $A =$ _____

$A =$ _____



d. $A =$ _____

$A =$ _____



3. A dinner plate has a diameter of 12 centimeters. What is the area in terms of π ?

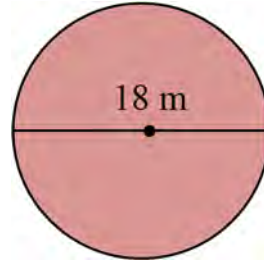
4. What is the area using approximations for π ?

Calculate the area of each circle in terms and using approximations for π . Round the answer to the tenth decimal place. (Use $\pi = 3.14$) $A = \pi r^2$

5. A lawn sprinkler sprays water 1.5 meters in every direction as it rotates. What is the area of the sprinkled lawn in both terms of π and rounded to the nearest hundredths?

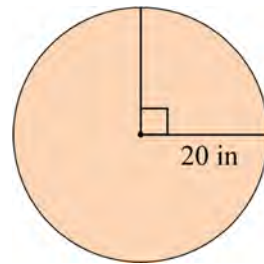
6. What is the area of the circle?

- A $18 \pi \text{ m}^2$
 B $81 \pi \text{ m}^2$
 C $36 \pi \text{ m}^2$
 D $324 \pi \text{ m}^2$



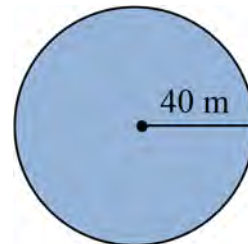
7. What is the area of the quarter of the circle?

- A $200 \pi \text{ in}^2$
 B $25 \pi \text{ in}^2$
 C $50 \pi \text{ in}^2$
 D $100 \pi \text{ in}^2$



8. Eric drew a circle with a diameter of 16 centimeters. What is the area of Eric's circle?

9. What is the area of this circle?



10. Marie measures the bottom of a cup from her muffin pan and calculates it has an area of 28.26 square centimeters. What is the cup's diameter?

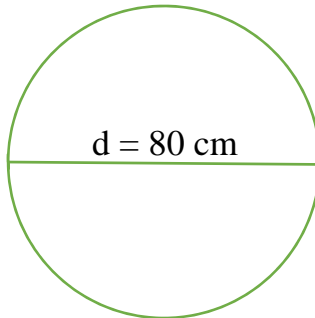


7.GM.3.2 Calculate the circumference and area of circle to solve problems in various contexts, in terms and using approximations for π .

Calculate the circumference of each circle in terms of π and using approximations for π . Round the answer to the tenth decimal place if needed. (Use $\pi = 3.14$) $C = \pi d$ or $C = 2\pi r$

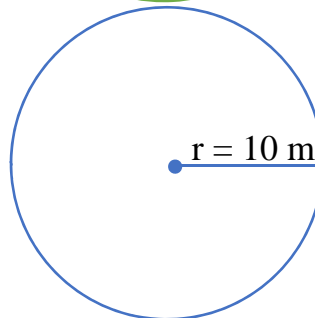
1. $C = \underline{\hspace{2cm}}$

$C = \underline{\hspace{2cm}}$



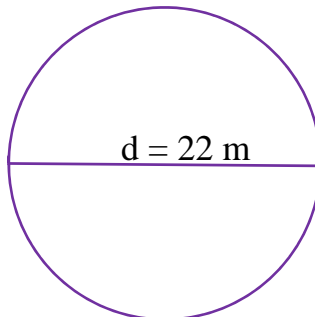
2. $C = \underline{\hspace{2cm}}$

$C = \underline{\hspace{2cm}}$



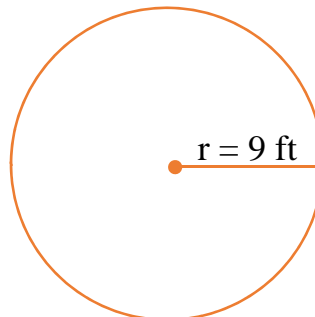
3. $C = \underline{\hspace{2cm}}$

$C = \underline{\hspace{2cm}}$



4. $C = \underline{\hspace{2cm}}$

$C = \underline{\hspace{2cm}}$



Independent Practice (7.GM.3.2)

Name _____

Calculate the area of each circle in terms of π and using approximations for π . Round the answer to the tenth decimal place. (Use $\pi = 3.14$) $A = \pi r^2$

5. $d = 36$ ft

$A = \underline{\hspace{2cm}}$

$A = \underline{\hspace{2cm}}$

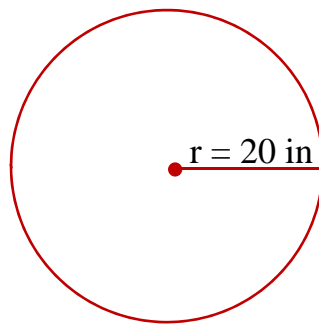
6. $r = 55$ m

$A = \underline{\hspace{2cm}}$

$A = \underline{\hspace{2cm}}$

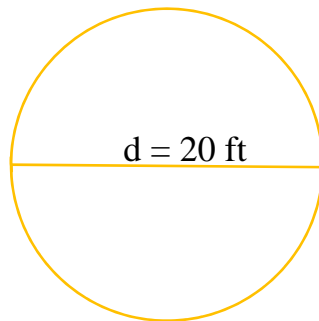
7. $A = \underline{\hspace{2cm}}$

$A = \underline{\hspace{2cm}}$



8. $A = \underline{\hspace{2cm}}$

$A = \underline{\hspace{2cm}}$



9. A storm is expected to hit 8 miles in every direction from a small town. What is the area that the storm will affect? Round to nearest whole number.

10. A dog is tied to a wooden stake in a backyard. Her leash is 10 feet long, and she runs around in circles pulling the leash as far as it can go. How much area does the dog need to run?

Calculate the area of each circle in terms of π and using approximations for π . Round the answer to the tenth decimal place. (Use $\pi = 3.14$) $A = \pi r^2$

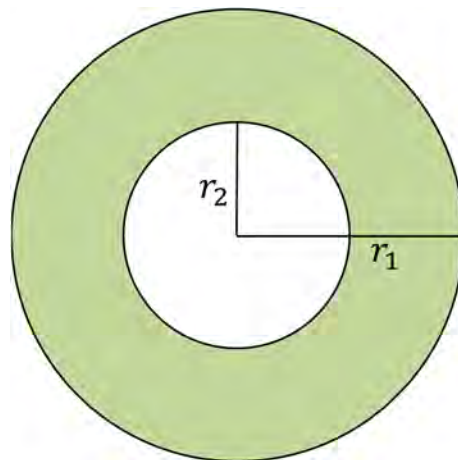
11. Nine and three-sevenths feet of ribbon is glued to the circumference of a round table. What is the diameter of the table? Use $\pi = \frac{22}{7}$.

12. What is the area of the table from question 11? Round to the nearest hundredth.

Choose the best answer.

13. Katie drew two circles. One circle has a radius of 20 centimeters, and the other circle has a radius of 10 centimeters. What is the difference between the areas of the two circles?

- A 600 centimeters²
B 814 centimeters²
C 942 centimeters²
D 1256 centimeters²



14. _____ is the perimeter of a circle.

- A Area
B Circumference
C Radius
D Diameter

15. The circle in the center of a professional basketball court has a diameter of 12 feet. What is the circumference, of the circle in feet?

- A 6π feet
B 12π feet
C 24π feet
D 144π feet

Choose the best answer.

16. What is the area of the circle in the center of a professional basketball court, from question 15?

A $36 \pi \text{ feet}^2$
B $12 \pi \text{ feet}^2$
C $6 \pi \text{ feet}^2$
D $144 \pi \text{ feet}^2$

Solve.

17. If the circumference of a telescope lens is 6.28 meters, what is the area of the lens?

Write a scenario for the following problem.

18. $A = \pi r^2$
 $r = ?$
Area = 3.14 meters

Solve.

19. A farmer measured a crop circle and calculated it to have a circumference of 257.48 meters. What is the radius of the crop circle?



20. What is the area of the crop circle from question 19?

Solve the problems below using your knowledge of circumference and area concepts. Use 3.14 for π . Round to the nearest tenths.

1. What is the diameter of a circle with radius of 36 inches?

2. What is the circumference of a circle with a diameter of 10 centimeters?

3. Johnny needs at least \$25 to buy the video games he wants. Write and graph the inequality represented in this situation.

4. A grocery store had a sale on sherbet. Each flavor cost x number of dollars. If Jerri buys one carton of orange and one carton of lime sherbet, what is the equation to represent how much she spent in total on sherbet?

5. Which property is shown below?

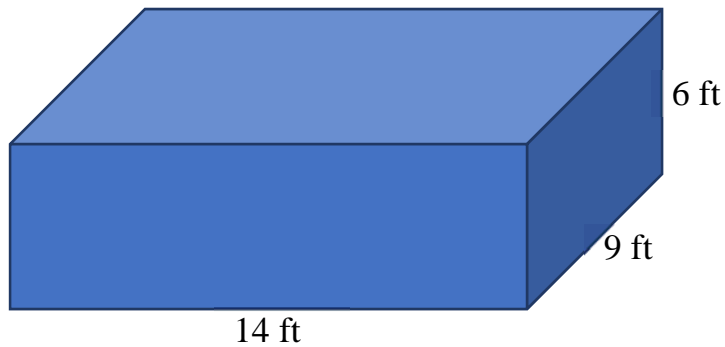
$$3 + 7 = 7 + 3$$

6. Evaluate

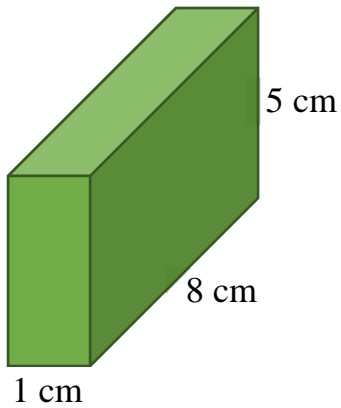
$$(0.5 \times 3) + 4^2$$

Read and answer the following questions.

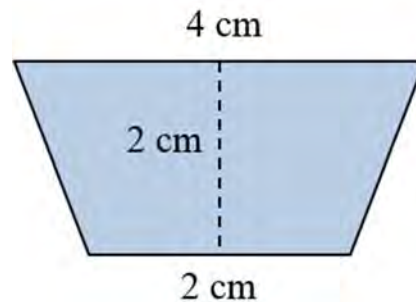
7. What is the volume of the rectangular prism?



8. Find the surface area of the following prism. Use $2(wl + hl + hw)$.



9. Find the area of the trapezoid. Use $A = \frac{1}{2}h (b_1 + b_2)$



Answer the following question.

10. Marla is making a presentation board for the school elections. The foam board is a 28 inches \times 22 inches rectangle. She needs to add a ribbon border around the entire display board. What is the total length of ribbon she needs to go around the entire board? If ribbon costs \$2.00 per foot, how much will it cost to add a ribbon border around the entire display board? Round to the nearest dollar.

7.GM.4.1 Describe the properties of similarity, compare geometric figures for similarity, and determine scale factors resulting from dilations.

Real-World Connections

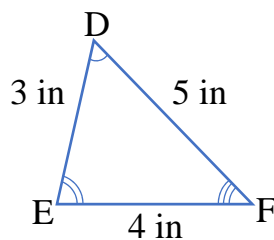
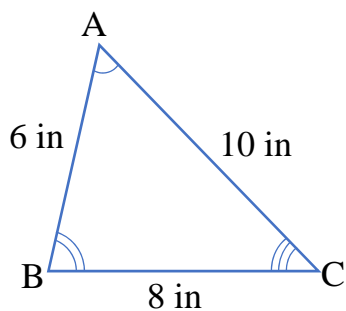
Dilation, similar figure, and scale factor are all terms used in math to describe how a shape or measurements are changed to achieve a similar shape and its measurements. A dilation is a transformation that changes the size of a figure or image to create a similar image. The scale factor describes how much a figure is enlarged or reduced, and a ratio of the lengths of corresponding sides of similar figures. When a figure is dilated, its size is changed by multiplying the length of each side by a scale factor. All angles remain the same, and so the new shape (or image) is similar to the original. This is most commonly used when referring to maps, models (houses, stuffed animals, toy cars, action figures) and murals. Try to think of other professions or times you would need to make an actual item smaller or larger.

Vocabulary

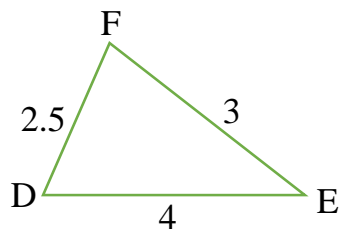
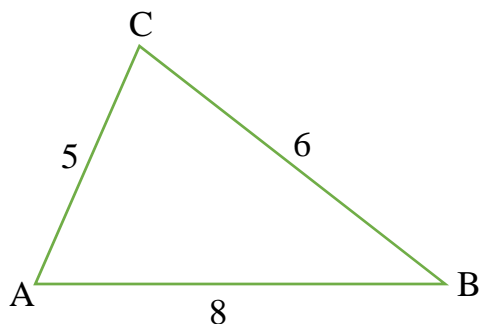
similar figures	having the same shape, but not necessarily the same size; the corresponding angles have equal measures, and the length of corresponding sides are proportional
properties of similarity	descriptors of polygons with the same shape, but not necessarily the same size; the corresponding angles have equal measures, and the length of corresponding sides are proportional
geometric figures for similarity	when two figures are similar, the ratios of the lengths of their corresponding sides are equal
scale factors	for similar shapes, the common ratio of corresponding side lengths is called the scale factor; informally, it is the multiplicative amount by which the lengths of one shape are enlarged or reduced to obtain a shape to which it is similar
dilations	a transformation moves each point along the ray through the point emanating from a fixed center, and multiplies distances from the center by a common scale factor

1. Determine if the figures below are similar and compare their corresponding sides.

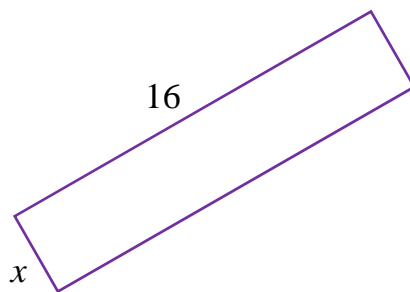
a. _____



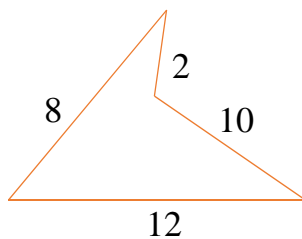
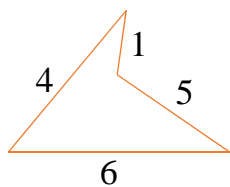
b. _____



c. _____

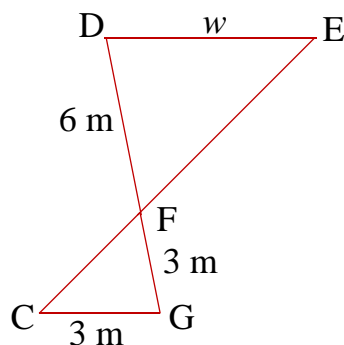


d. _____

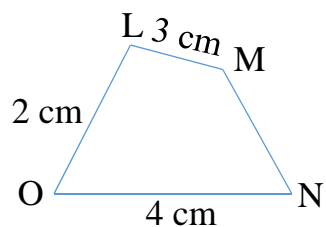
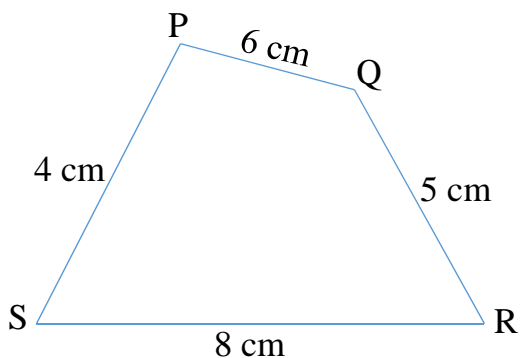


2. Given similar figures find the lengths of the missing sides.

a. _____



b. _____



Answer the following question.

3. Scale Factor

a. The scale of a map is 2 meters = 4 miles. Given a map 12 meters equals _____ actual miles.

b. The scale factor for a model is 8 centimeters = _____ kilometers.
Given a model: 2 centimeters and the actual length: 1 kilometers.

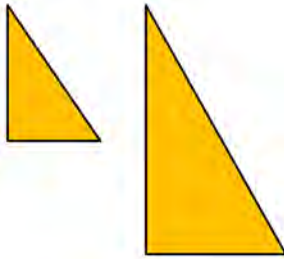
Answer the following questions.

4. Aubrey casts a shadow of 4 feet and she is 5 feet tall. A windmill casts a shadow of 32 feet at the same time that Aubrey measured her shadow. Draw a diagram of this situation and then calculate how tall the windmill is.

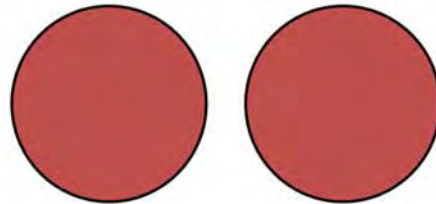
5. A 40-foot flagpole casts a 25-foot shadow. Find the shadow cast by a nearby building 200 feet tall. Draw a diagram and solve. Why would this be important to calculate?

6. Which shows a pair of shapes that appear to be similar but not congruent?

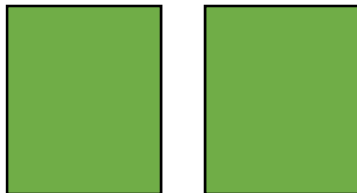
A



B



C



D

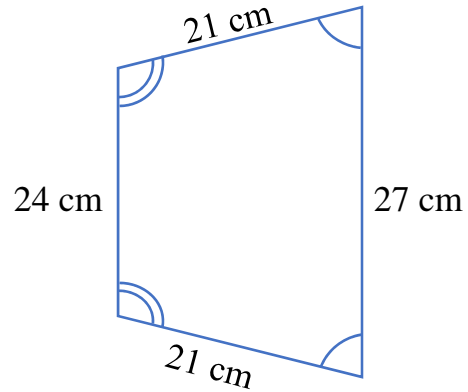
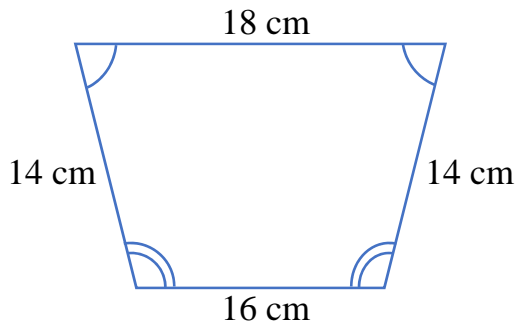


Guided Practice (7.GM.4.1)

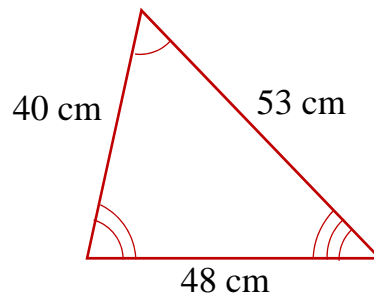
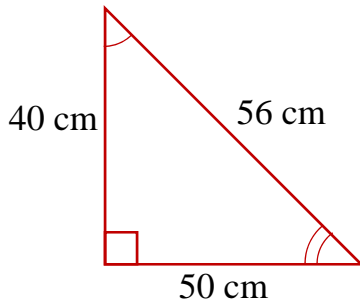
Name _____

Answer the following questions.

7. Are these shapes similar?



8. Are these shapes similar?



9. Shapes are _____ if their corresponding angles are all congruent and their corresponding sides are proportional.

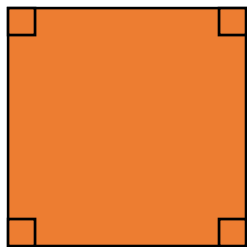
- A Parallel
- B Similar
- C Congruent
- D All of the above

Guided Practice (7.GM.4.1)

Name _____

Answer the following question.

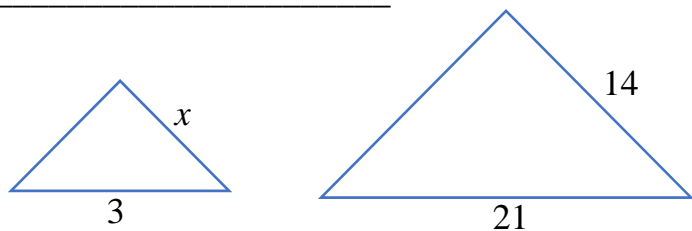
10. Are these shapes similar?



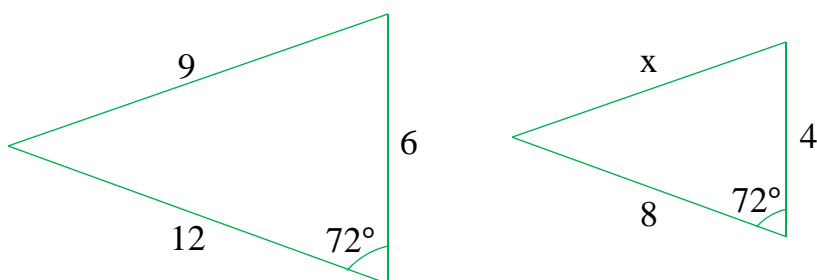
7.GM.4.1 Describe the properties of similarity, compare geometric figures for similarity, and determine scale factors resulting from dilations.

Determine if the figures below are similar by comparing their corresponding sides.

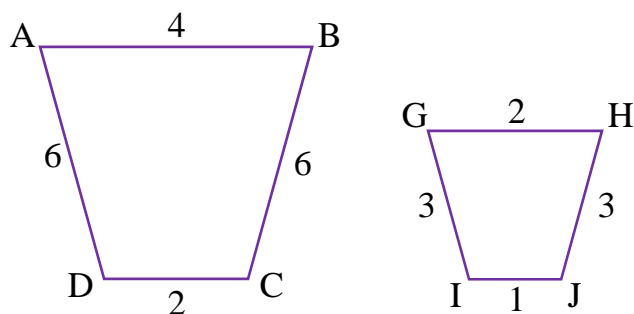
1. _____



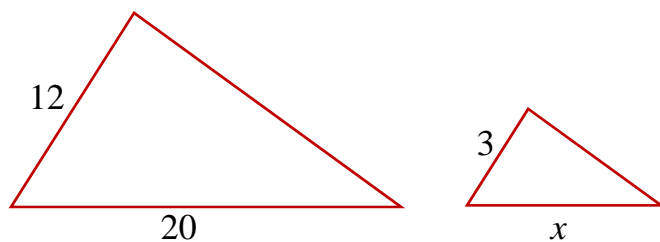
2. _____



3. _____



4. _____



Independent Practice (7.GM.4.1)

Name _____

Identify the scale factor.

5.		baby giraffe	stuffed giraffe
	Length (in)	75	25

6.		plane	toy plane
	Length (ft)	21	3

7.		person	action figure
	Length (in)	60	10

8.		boat	model
	Length (in)	144	12

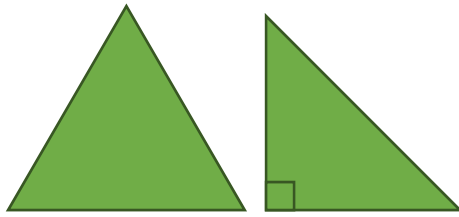
9. On a scale drawing, a doll house is 12 inches tall. The scale factor is $\frac{1}{6}$. Find the height of the house.

10. The scale of a map is 4 centimeters = 2 kilometers. If the map shows: 16 centimeters, the actual distance is: _____ kilometers

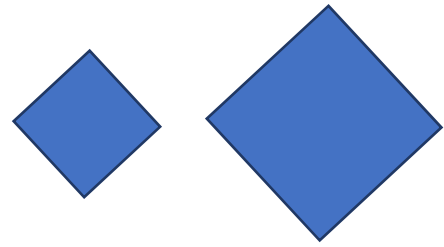
Answer the following questions.

11. Which shows a pair of shapes that appear to be similar but not congruent?

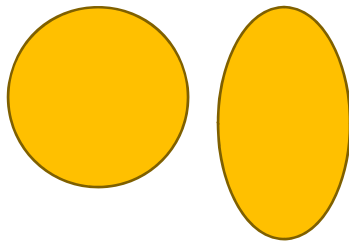
A



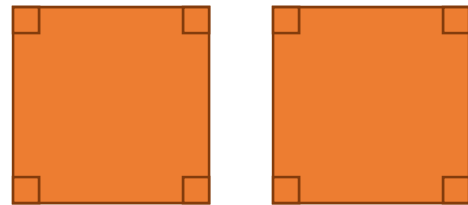
B



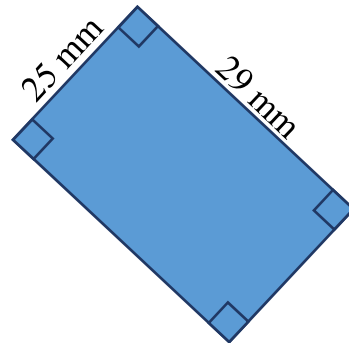
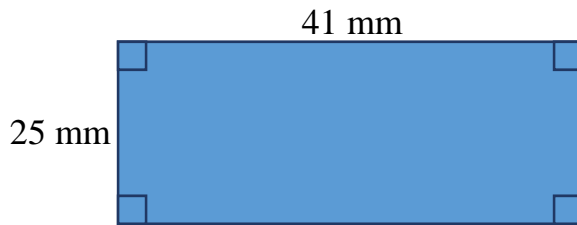
C



D



12. Are these shapes similar?



13. Are these shapes similar?

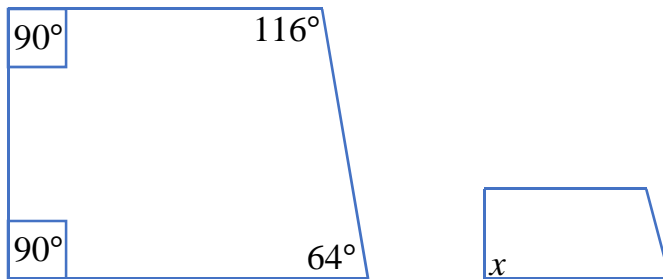


Answer the following questions.

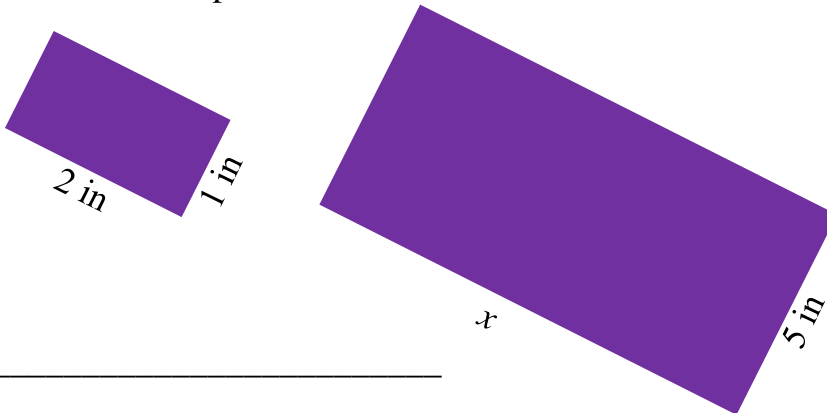
14. _____ means having exactly the same size and shape.

- A Parallel
- B Similar
- C Congruent
- D All of the above

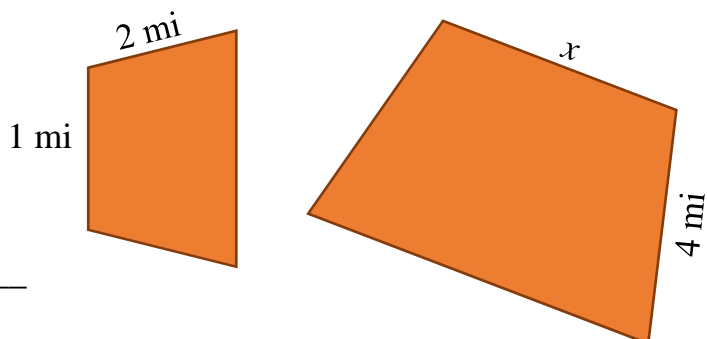
15. If these two figures are similar, what is the measure of the missing angle, x ?



16. If these two shapes are similar, what is the measure of the missing length?

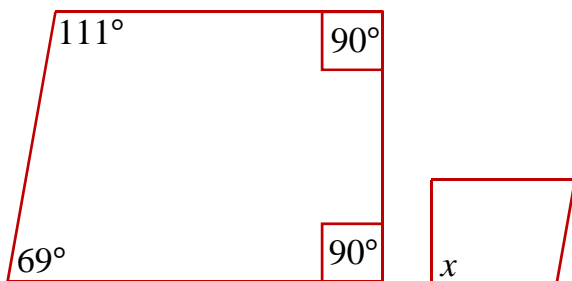


17. If these two trapezoids are similar, what is the measure of the missing length?

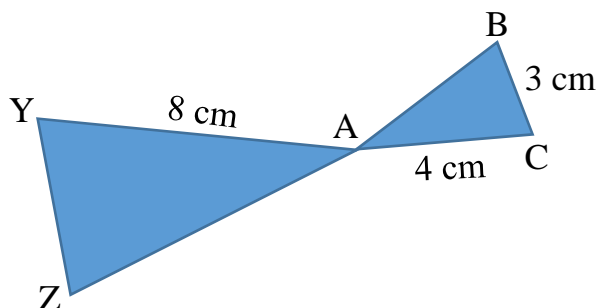


Answer the following questions.

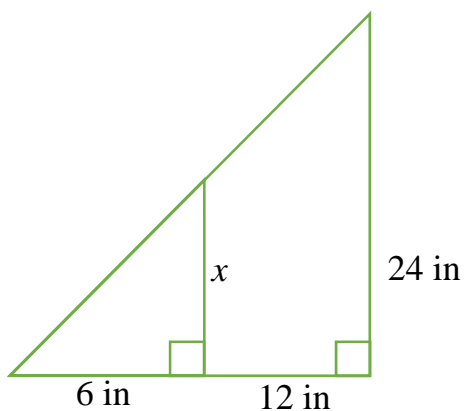
18. If these two quadrilaterals are similar, what is the measure of the missing angle, x ?



19. If $\triangle ABC \sim \triangle AYZ$, find the measure of side YZ.



20. Find x .



Given either the radius or diameter of a circle calculate the area ($A = \pi r^2$) and circumference ($C = \pi d$ or $2\pi r$) of the circle in both terms and the approximant π . Round to the nearest tenths if needed.

1. The diameter of a circle is 3.4 inches

Area = _____

Circumference = _____

2. Convert the following ratio to a decimal and identify as terminating or repeating.

$$\frac{16}{22}$$

3. Put the following numbers in order from least to greatest.

$$0.8, -\frac{1}{2}, 0, \frac{7}{2}$$

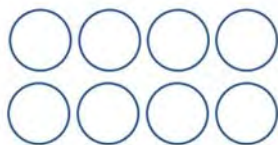
4. Complete the table below.

Fraction	Decimal	Percent
		61%

5. Abbigail brought 47 bags of candy for the party. Each bag contained 21 pieces of candy. Approximately how many pieces of candy are there in all?

Answer the following questions.

6. Using models, show the result of -4×2 .



7. If the diameter of a circle is 22 meters, what is the circle's radius?

8. Tristan got a summer job delivering newspapers. He makes \$25.00 per week plus \$0.20 for each paper he delivers. How much will Tristan make if he delivers a total of 50 papers per week?

9. Kellie and her friends are painting a mural for art class. The wall is divided into several different sections: four sections of 2.5 feet \times 3 feet, two sections of 4 feet \times 5 feet, two sections of 2 feet \times 2.5 feet and one section of 5 feet \times 30 feet. What is the total area of the wall?

10. Evaluate.

$$23^3$$

7.GM.4.2 Apply proportions, ratios, and scale factors to solve problems involving scale drawings and determine side lengths and areas of similar triangles and rectangles.

Real-World Connections

Have you ever seen a map? It cannot be the same size as the area it represents. The measurements are scaled down to make the map a size that can be used easily. Builders use scale drawings of a house or building that has the same shape as the real house or building it represents, but a different size. A ratio is used in both cases. Scale drawings of maps and buildings use the following ratios in the scales: of drawing scale = $\frac{\text{draw length}}{\text{actual length}}$ and map scale = $\frac{\text{map distance}}{\text{actual distance}}$. This is the scale factor = $\frac{\text{model}}{\text{actual length}}$. This method can also be used when determining similar triangles and rectangles.

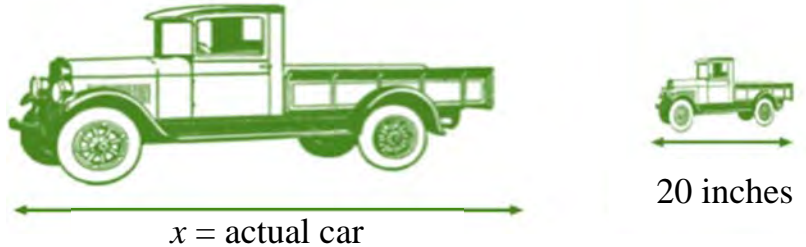
Vocabulary

scale	the ratio of measurement for the drawing compared to the measurement for the original subject
side	the lateral face of a three-dimensional solid; the line joining the vertices of a polygon
lengths	distance from one end to the other
area of similar triangles	if two similar triangles have sides in the ratio $x:y$, their areas are in the ratio $x^2:y^2$
transformation	a prescription, or rule, that sets up a one-to-one correspondence between the points in a geometric object and the points in another geometric object; reflections, rotations, translations, and dilations are examples of transformations

Complete the following problems.

1. The length of a car is to be drawn to scale. The scale of the drawing is 1:20. If the length of the scale drawing of the car is 12 inches, how long is the vehicle in real life? Set up a proportion

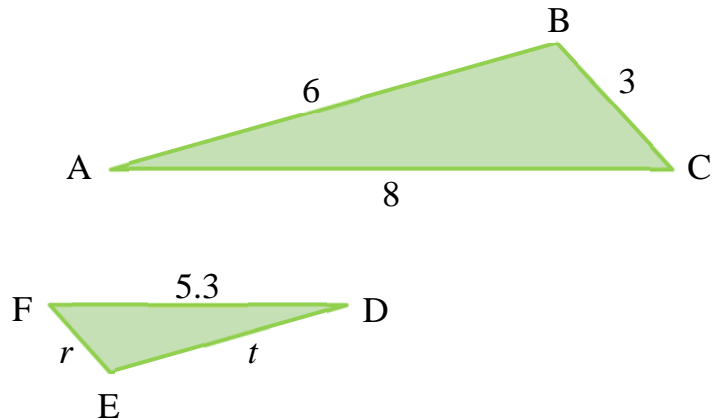
$$\frac{\text{drawing length}}{\text{actual length}} = \frac{1}{20} = \frac{12}{x}$$



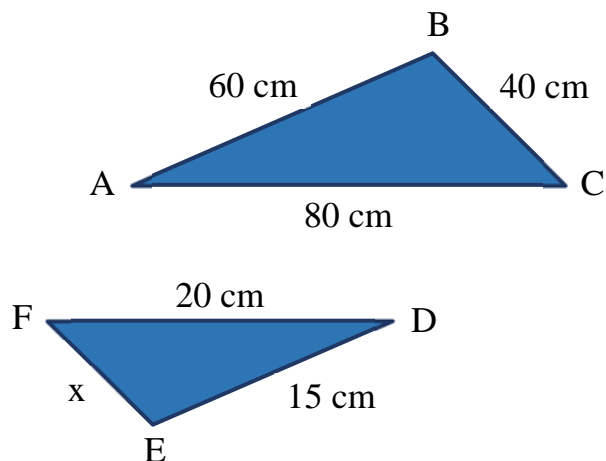
2. Given the following angles are congruent. When $\angle ABC \cong \angle DEF$, $\angle BCA \cong \angle EFD$, and $\angle CAB \cong \angle FDE$, and triangle ABC is similar to triangle DEF, what is the length of the missing sides? (Round to the nearest whole number)

$r =$ _____

$t =$ _____

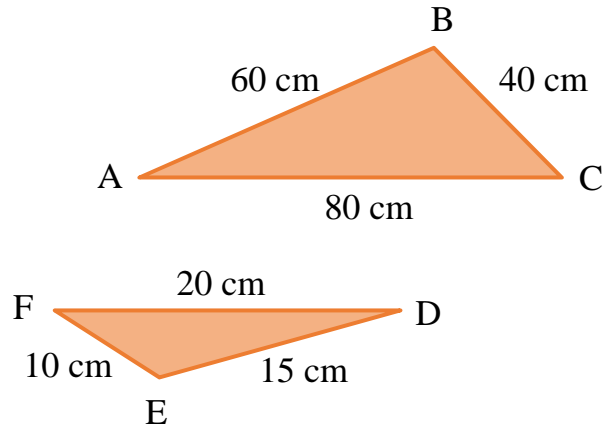


3. Given the following angles are congruent. When, $\angle ABC \cong \angle DEF$, $\angle BCA \cong \angle EFD$, $\angle CAB \cong \angle FDE$, and triangle ABC is similar to triangle DEF, what is the length of x ?



Complete the following problems.

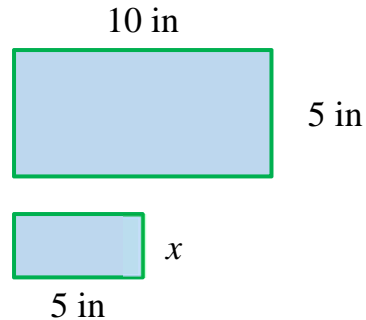
4. Triangle ABC is similar to triangle DEF, what is the ratio of the areas?



5. The following rectangles are similar. Determine the scale factor to calculate the missing length and the area.

$x =$ _____

$A =$ _____



Choose the best answer.

6. Ryker made a scale model of his bedroom. The actual length of his bedroom is 20 feet. The length of his model is 4 inches. What is the ratio of the length of Ryker's bedroom to the length of his model?

- A 1 foot : 4 inches
- B 4 feet : 1 inches
- C 5 feet : 1 inches
- D 20 feet : 1 inches

Complete the following problems.

7. Caroline made a scale drawing of a city. The scale she used was 1 inch = 5 yards. A neighborhood park is 20 inches in the drawing. How wide is the actual park?

Complete the following problems.

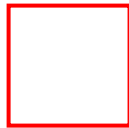
8. Chandler drew a scale drawing of a house. He used 1 centimeters = 3 meters. If the actual length of the garage is 9 meters, how long is the garage in the drawing?

9. Halley measured a house with its lot and made a scale drawing. The porch, which is 10 yards long in real life, is 10 inches long in the drawing. What scale did Halley use?

Choose the best answer.

10. If the side lengths of this square are tripled, which of the following statements will be true?

10 cm



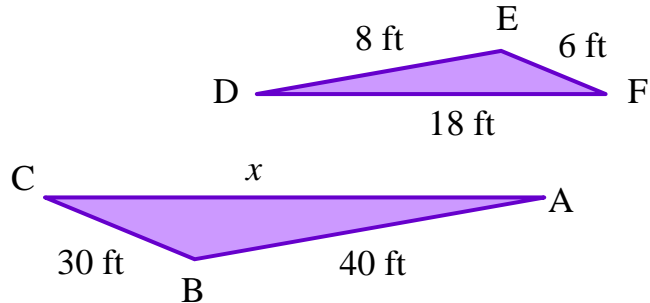
10 cm

- A The new perimeter will be $\frac{1}{2}$ of the old perimeter.
- B The new perimeter will be 2 times the old perimeter.
- C The new perimeter will be 3 times the old perimeter.
- D The new perimeter will be 4 times the old perimeter.

7.GM.4.2 Apply proportions, ratios, and scale factors to solve problems involving scale drawings and determine side lengths and areas of similar triangles and rectangles.

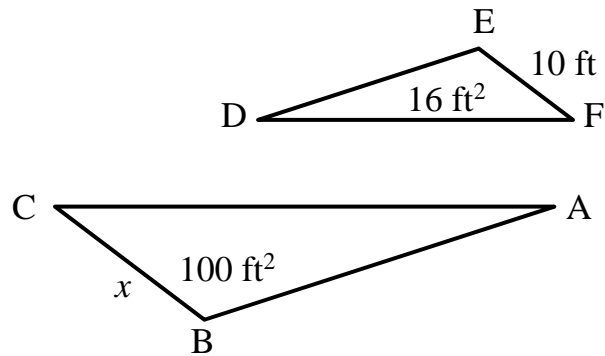
Complete the following problems.

1. Given the following angles are congruent. When $\angle ABC \cong \angle DEF$, $\angle BCA \cong \angle EFD$, $\angle CAB \cong \angle FDE$, and triangle ABC is like triangle DEF, what is the scale factor?



2. What is the length of x ?

3. Triangles ABC and EFD are similar. The area of triangle ABC is 100 units², and the area of triangle EFD is 16 units². $\overline{EF} = 10$ feet. What is the length of \overline{BC} ?

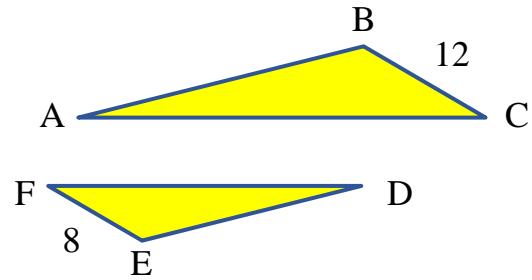


Independent Practice (7.GM.4.2)

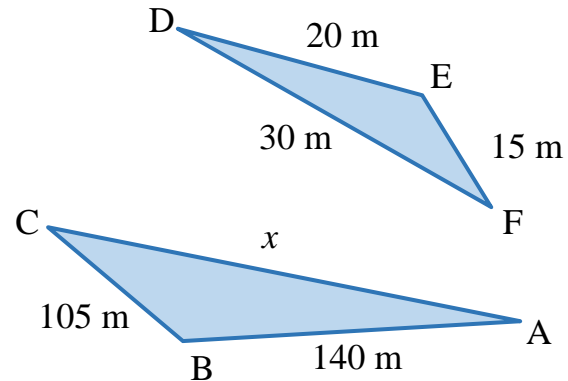
Name _____

Complete the following problems.

4. Triangles ABC and EFD are similar. The area of triangle ABC is 81 units². What is the area of triangle EFD?

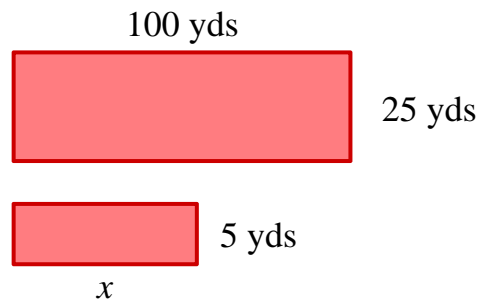


5. Given that the following angles are congruent. When, $\angle ABC \cong \angle DEF$, $\angle BCA \cong \angle EFD$, $\angle CAB \cong \angle FDE$, and triangle ABC is similar to triangle DEF, what is the scale factor?



6. What is the length of x ?

7. The following rectangles are similar. Determine the scale factor to calculate the missing length?



8. What is the area of each?

Complete the following problems.

9. The scale factor of two similar pieces of window glass is 3:7. The smaller piece cost \$3.50. How much should the larger piece cost if it is three times bigger?

10. Chuck is having carpet installed in a small office. It will cost \$75.00 for a room that measures 6 feet \times 5 feet. At this rate, how much would it cost to have carpet installed in a similarly shaped living room with a larger dimension of 24 feet \times 20 feet ?

Choose the best answer.

11. Anna made a scale model of her lawn. The actual length of her lawn is 32 feet. The length of her model is 8 inches. What is the ratio of the length of Anna's lawn to the length of her model?

- A 1 foot : 4 inches
- B 4 feet : 1 inch
- C 1 foot : 25 inches
- D 25 feet : 1 inch

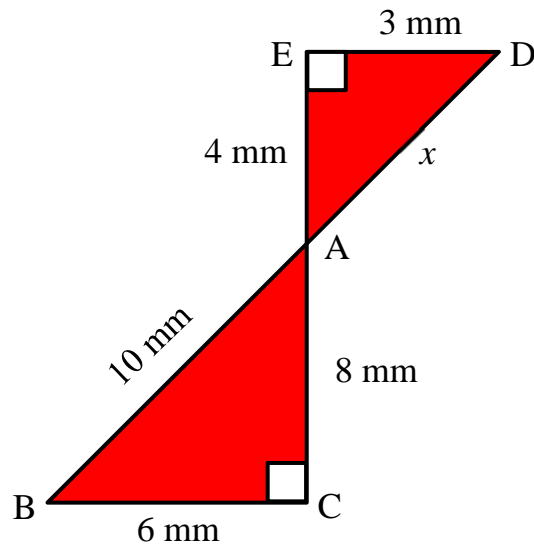
Complete the following problems.

12. Lance made a scale drawing of a summer camp. The sand volleyball court, which is 48 feet long in real life is 6 inches long in the drawing. What is the scale of the drawing?

13. Principal Haggard drew a scale drawing of the middle school auditorium. The scale he used was 1 centimeters = 3 meters. If the stage is 15 centimeters in the drawing, how long is the actual stage?

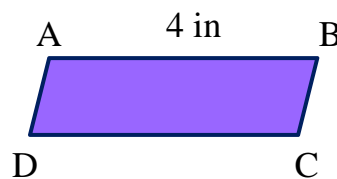
Complete the following problems.

14. Triangle ABC is similar to triangle ADE. Which proportion can be used to find side length x ?

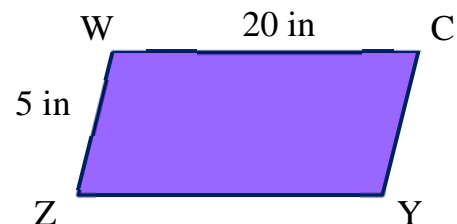


- A $\frac{6}{3} = \frac{x}{10}$
 B $\frac{4}{10} = \frac{3}{x}$
 C $\frac{6}{3} = \frac{10}{x}$
 D $\frac{x}{3} = \frac{6}{10}$

15. Quadrilateral ABCD is similar to quadrilateral WXYZ. What is the length of side AD?

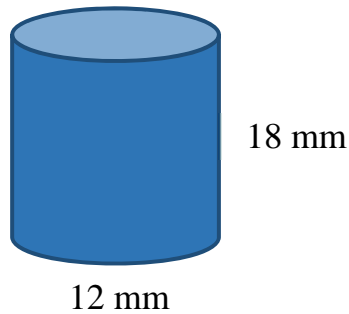


- A 1 inch
 B 2 inches
 C 2.5 inches
 D 5 inches



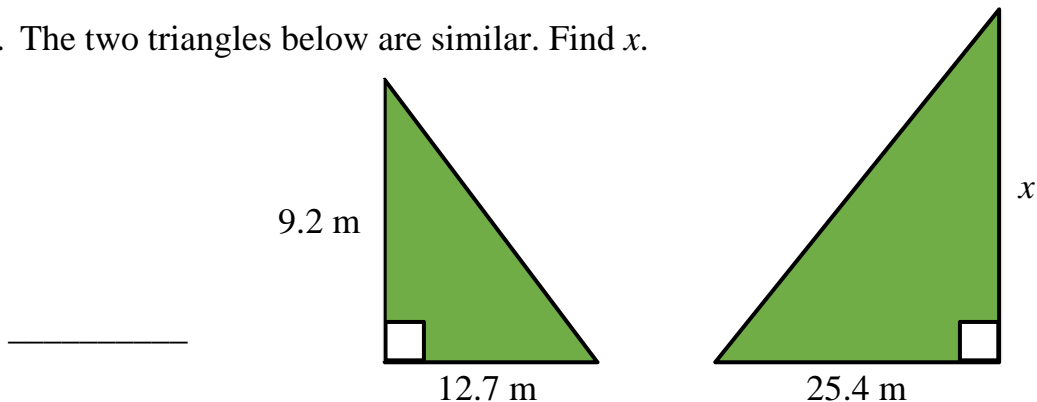
Choose the best answer.

16. Which of the following could be the dimensions of a different cylinder that is similar to the one shown?



- A Diameter = 6 mm, height = 4 mm
B Diameter = 3 mm, height = 4 mm
C Diameter = 4 mm, height = 6 mm
D Diameter = 4 mm, height = 8 mm
17. Reece made a scale drawing of the school art room. The actual room is 16 feet wide and 24 feet in length. Her drawing is 2 inches wide. What is the length in inches of the art room's scale drawing?
- A 4 inches
B 3 inches
C 2 inches
D 1 inch

18. The two triangles below are similar. Find x .



Complete the following problems.

19. Calvin measured the middle school and made a scale drawing. The actual gym is 56 feet wide. It is 14 inches wide in the drawing. What scale did Calvin use?

20. An architect made a scale drawing of a house and its lot. The scale of the drawing is 14 centimeters = 5 meters. The actual back patio is 30 meters long in real life. How long is the patio in the drawing?

Given similar figures find the lengths of the missing sides.

1. Two rectangles are similar. The first is 3 inches wide and 15 inches long. The second is 9 inches wide. Find the length of the second rectangle.

Solve.

2. $75 + 5^2 =$ _____

3. $-|-63| + |-12| =$ _____

4. Madison is sponsoring a summer basketball camp. She needs to hire enough people to work the camp. There is a proportional relationship between the number of workers Madison hires, x , and the number of children who can attend the camp, y . If Madison hires 10 workers, 50 children can attend the camp. Write the equation for the relationship between x and y .

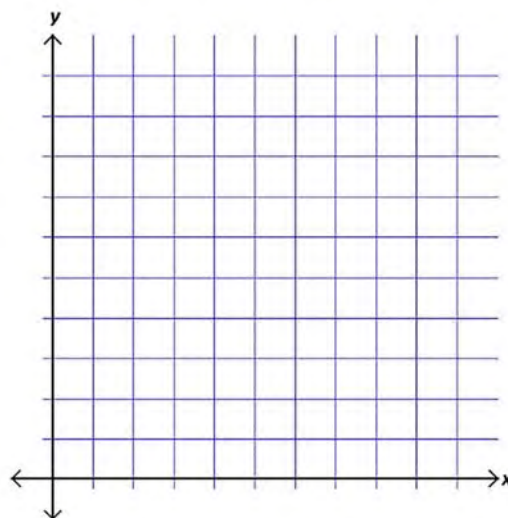
Solve the problem below using your knowledge of circumference and area concepts. Use 3.14 for π . Round to the nearest tenths.

5. What is the radius of a circle with a diameter of 18 centimeters?

Complete the following problems.

6. Using the table below, plot the points on the coordinate graph. Does the graph represent a proportional relationship?

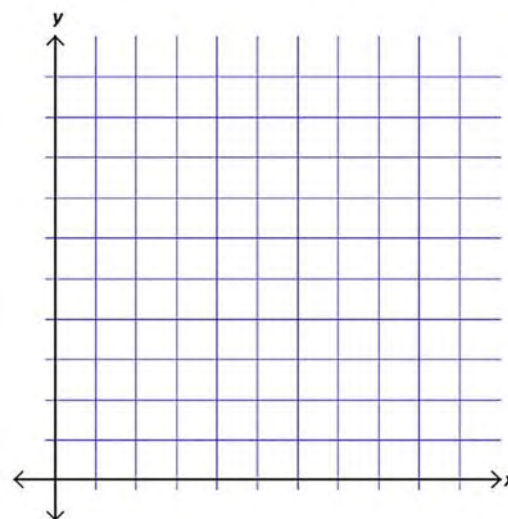
x	y
4	8
5	10
6	12
8	14



7. Mason got a job helping his elderly neighbors and makes \$40.00 for working 4 hours. Complete the table to show how these two quantities vary, graph them on the coordinate grid, and describe the unit rate or slope.

x	1	2	3	4
y				

Unit rate= _____



Complete the following problems.

8. Your family goes to dinner at a restaurant. The total before tax is \$34.88 and the tax is 7.25%. What is the total cost after tax? Round to the nearest hundredth.

9. A semi-circle rug has a diameter of 4 feet. What is the area of the rug?

10. Chloe is taking her family on a trip for eight days. She has three dogs. Two dogs stay at Dr. Chambers' Vet Clinic for \$15.00 a day per dog. They must also receive their current vaccinations for \$82.50 each. Her third dog is going, but needs a flea treatment to stay with her. She finds out she has an outstanding balance of \$5.60 for medication, and the flea treatment is \$13.00. Write and evaluate an expression for this problem to solve how much Chloe must pay the clinic.

7.GM.4.3 Graph and describe translations and reflections of figures on a coordinate plane and determine the coordinates of the vertices of the figure after the transformation.

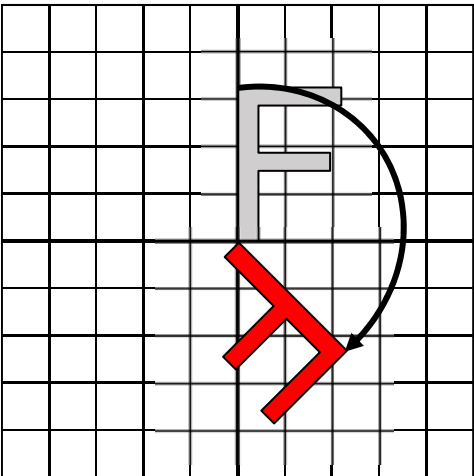
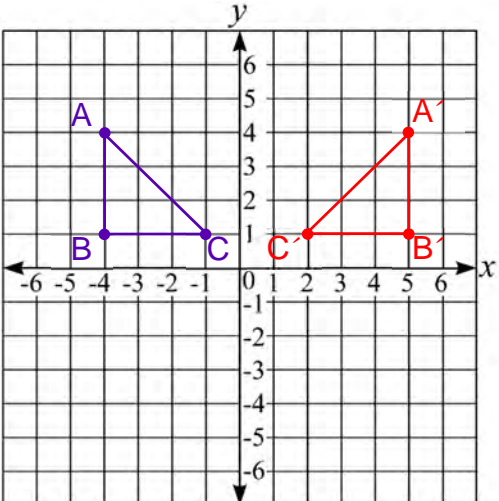
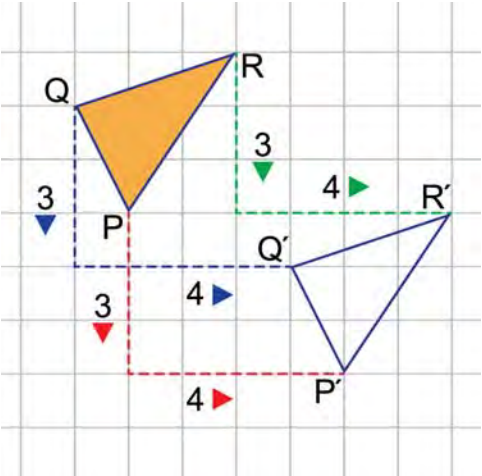
Real-World Connections

There are many figure transformations all around you. If you have seen a picture in a mirror, this is a reflection. When you enlarge an image on a computer that is an enlargement. Pushing an object across a table, this is a translation. Opening a door, or a globe spinning is a rotation. In this lesson, you will graph and describe translations and reflections of figures on a coordinate plane.

Vocabulary

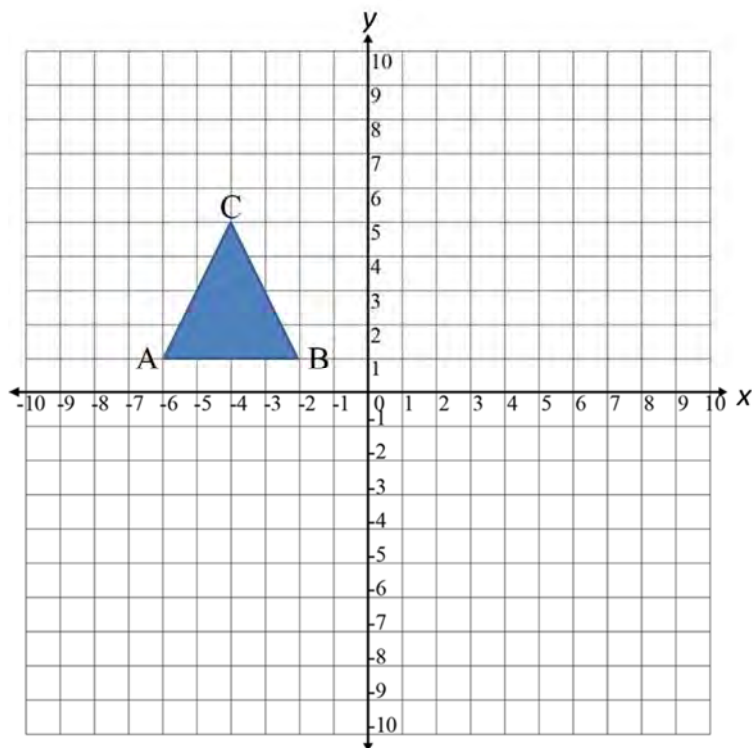
graph	a visual diagram used to represent statistical information or functions and equations
translation	a type of transformation that moves every point on a graph or geometric figure the same distance in the same direction without a change in orientation or size
reflection	a type of transformation that flips points above a line, called the line of reflection; taken together, the image and the pre-image have the line of reflection as a line of symmetry
figures	a visible shape or form; outline
coordinate plane	a plane in which a point is represented using two coordinates that determine the precise location of the point
coordinates	coordinates are written as ordered pairs of numbers or letters and numbers
vertices	a point where: <ul style="list-style-type: none"> • two or more rays or the sides of an angle meet • the adjacent sides of a polygon meet • the edges of a solid figure meet
transformation	a prescription, or rule, that sets up a one-to-one correspondence between the points in a geometric object and the points in another geometric object; reflections, rotations, translations, and dilations are examples of transformations

Identify the graph pictured in the chart below and describe how each is one of the three types of transformations: reflection, rotation, and translation.

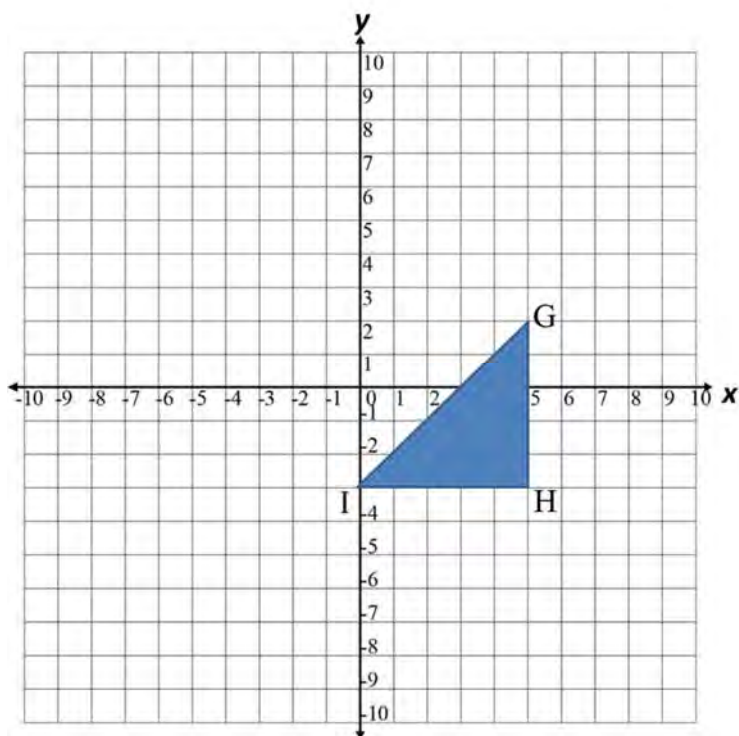
<p>1.</p> 	
<p>2.</p> 	
<p>3.</p> 	

Graph each transformation.

4. Translate $\triangle ABC$ 6 units to the right and 2 units down.



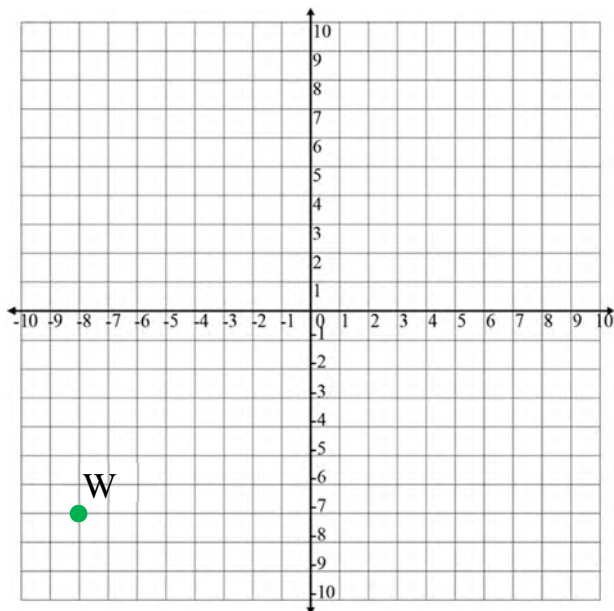
5. Rotate $\triangle GHI$ 90° counterclockwise about the vertex I.



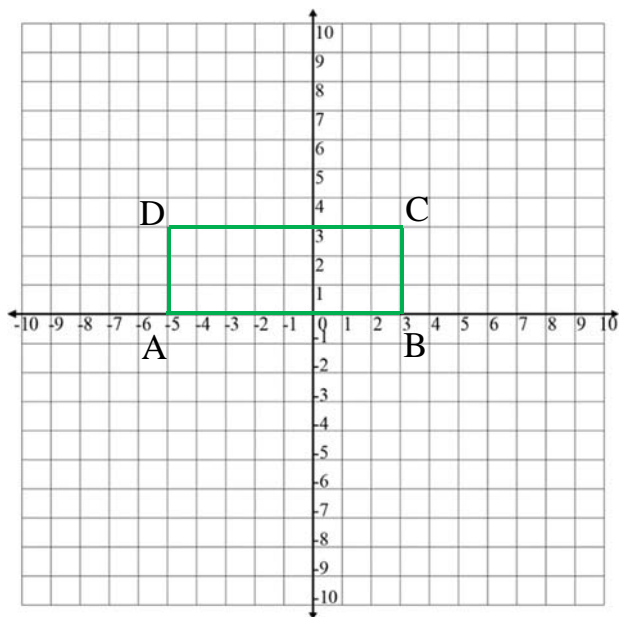
Complete the following questions.

6. A point, P $(-2, 1)$ is translated 3 units right. What are the coordinates of the resulting point?

7. Graph the point W $(-8, -7)$ after a reflection over the y-axis.

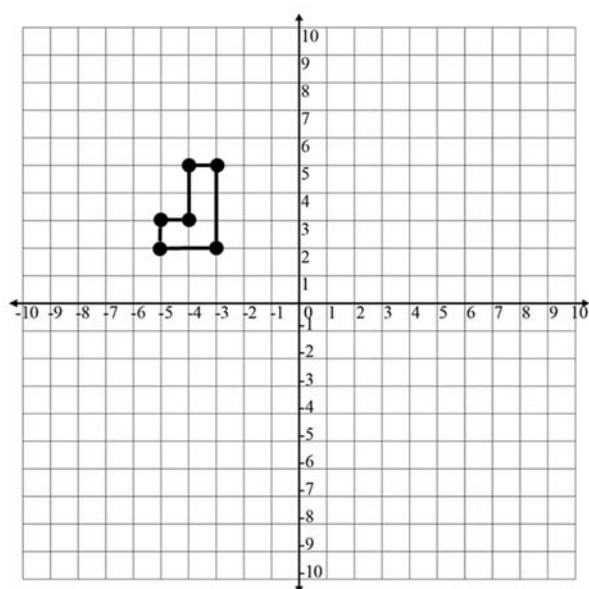


8. What are the new coordinates of the rectangle below if it is translated four units up?



Complete the following questions.

9. Graph the following figure reflected across the x-axis.



10. Graph and label the following points. Connect the points.

E (3, 8)

F (7, 8)

G (3, 3)

H (7, 3)

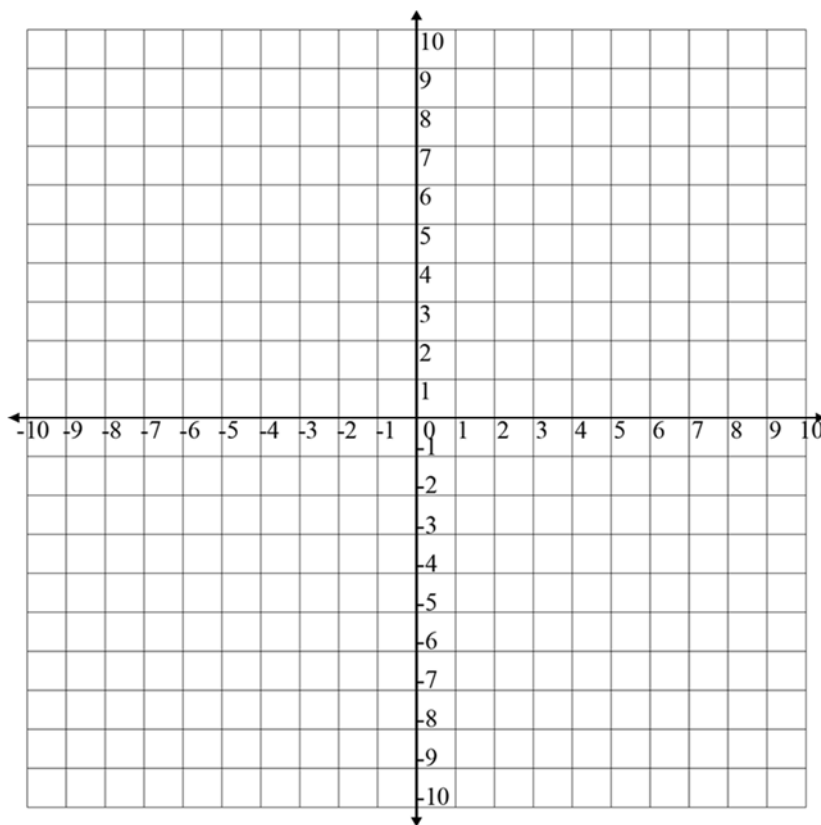
Draw the figure
reflected over the y-
axis, label and
connect the points.

E' (-3, 8)

G' (-3, 3)

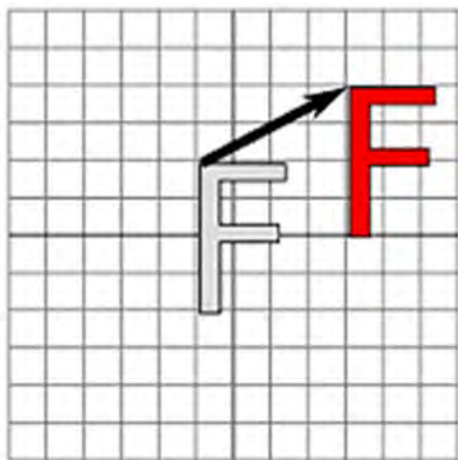
F' (-7, 8)

H' (-7, 3)

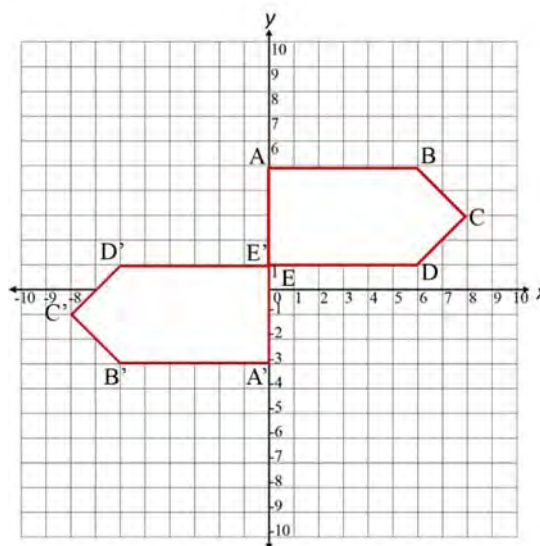


7.GM.4.3 Graph and describe translations and reflections of figures on a coordinate plane and determine the coordinates of the vertices of the figure after the transformation.

Identify the type of transformation.

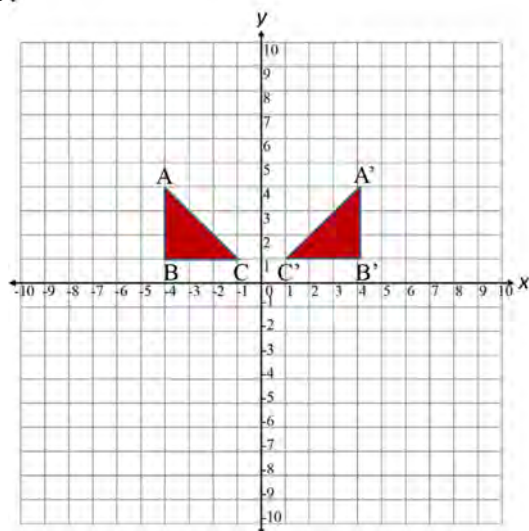


1.

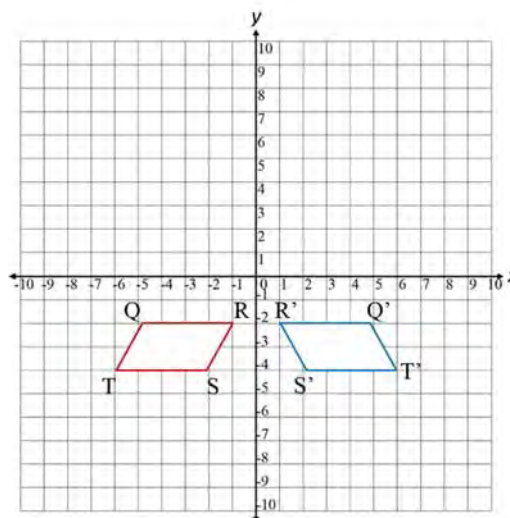


2.

3.



4.

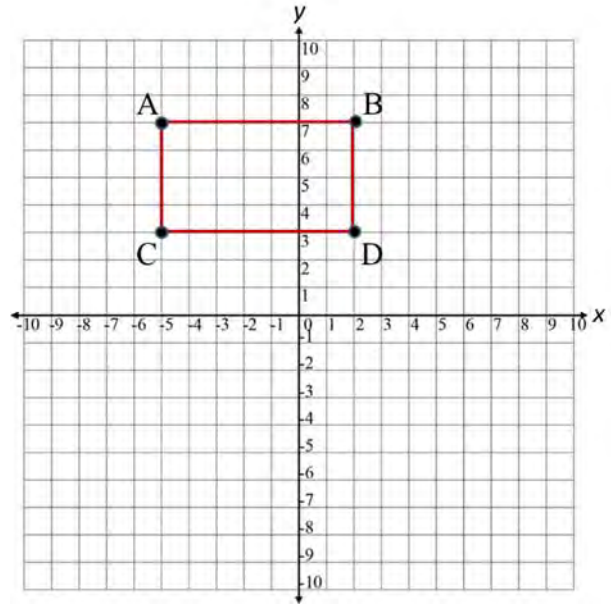


Independent Practice (7.GM.4.3)

Name _____

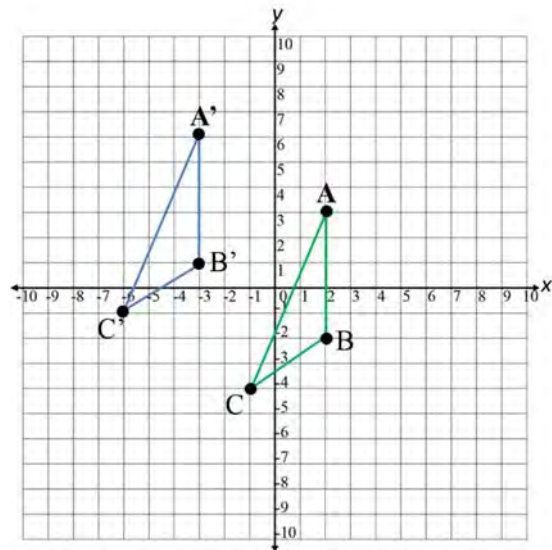
Complete the following questions.

5. Translate the image four units to the right and 6 units down.

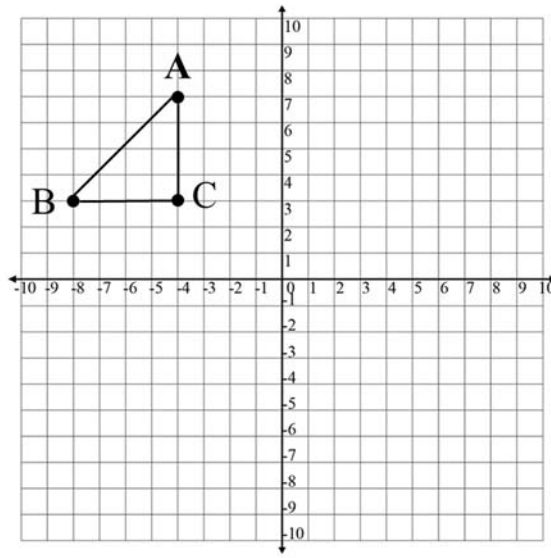


6. What are the new coordinates of the image after the translation?

7. Triangle ABC is a translation of triangle A'B'C'. Describe the translation.

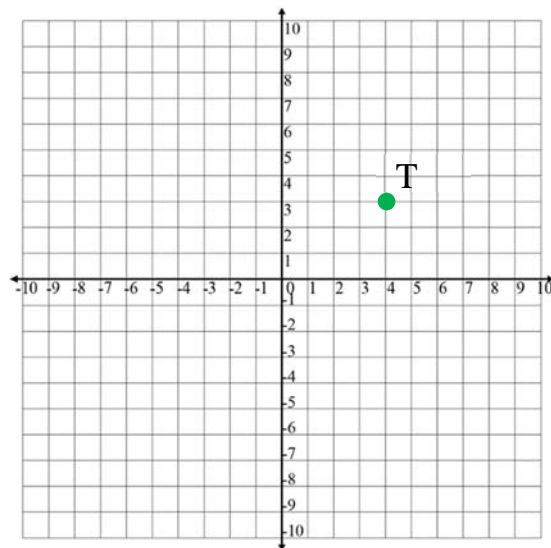


Draw the reflection of image ABC over the y -axis. Label the points A' , B' , and C' . List the coordinates.

8. A' _____9. B' _____10. C' _____

11. A point, $P(-5, -7)$ is translated 6 units up. What are the coordinates of the resulting point?

12. The point $T(4, 3)$ is reflected over the y -axis. What are the coordinates of the resulting point?



Complete the following questions.

13. For the following relationship, complete the table to show how these two quantities relate.

Apples cost $.68¢$ per lb.

x	1	5	7	9
y	$.68¢$			

- A $x = 1, 5, 7, 9$
 $y = 0.68, 3.4, 4.76, 6.12$
- B $x = 1, 5, 7, 9$
 $y = 0.68, 3.45, 4.83, 6.21$
- C $x = 1, 5, 7, 9$
 $y = 0.68, 3.5, 4.90, 6.30$
- D $x = 1, 5, 7, 9$
 $y = 0.68, 3.35, 4.69, 6.03$

14. For the following relationship, complete the table to show how these two quantities relate.

Erika runs 10 miles in 4 hours at the gym.

Hours	0	1	
Miles			5

- A Hours = 0, 1, 2, 3
Miles = 0, 3.5, 5, 8.5
- B Hours = 0, 1, 5, 3
Miles = 0, 3.2, 5, 6.2
- C Hours = 0, 1, 3, 2
Miles = 0, 2, 5, 7
- D Hours = 0, 1, 2, 3
Miles = 0, 2.5, 5, 7.5

Answer the following questions.

15. For the following relationship, complete the table to show how these two quantities vary.

Clarence rides his bike 49 miles in 7 hours with his friends.

x	0	1		7
y			28	

- A $x = 0, 1, 2, 7$
 $y = 7, 14, 28, 49$
- B $x = 0, 1, 4, 7$
 $y = 0, 7, 28, 49$
- C $x = 0, 1, 2, 7$
 $y = 1, 7, 28, 14$
- D $x = 0, 1, 4, 7$
 $y = 0, 14, 28, 49$
16. For the following relationship, complete the table to show how these two quantities vary.

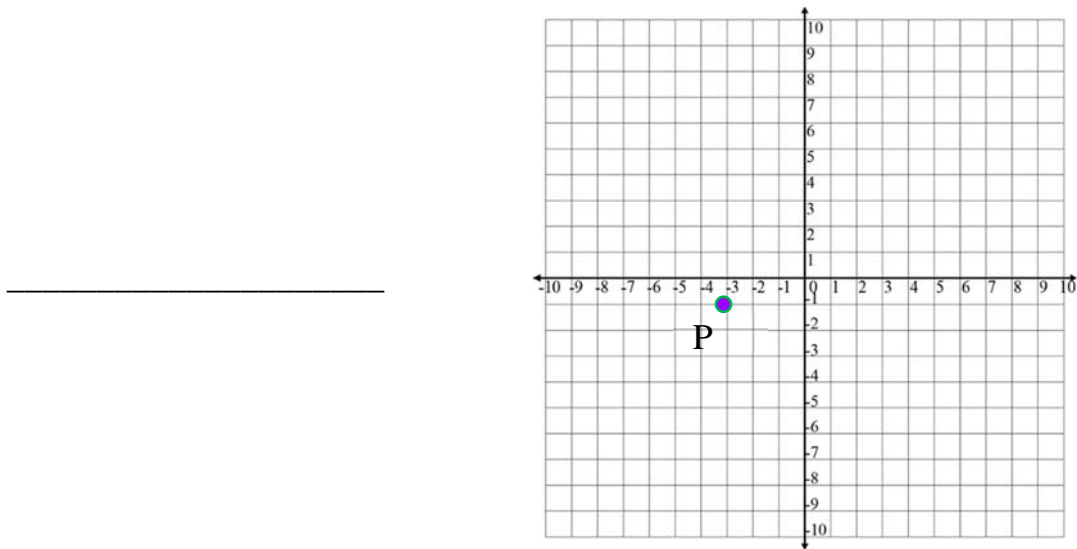
Gasoline cost \$3.15 per gallon in Tulsa

Gallons of Gas	0	1	2	3
Cost (\$)		3.15		

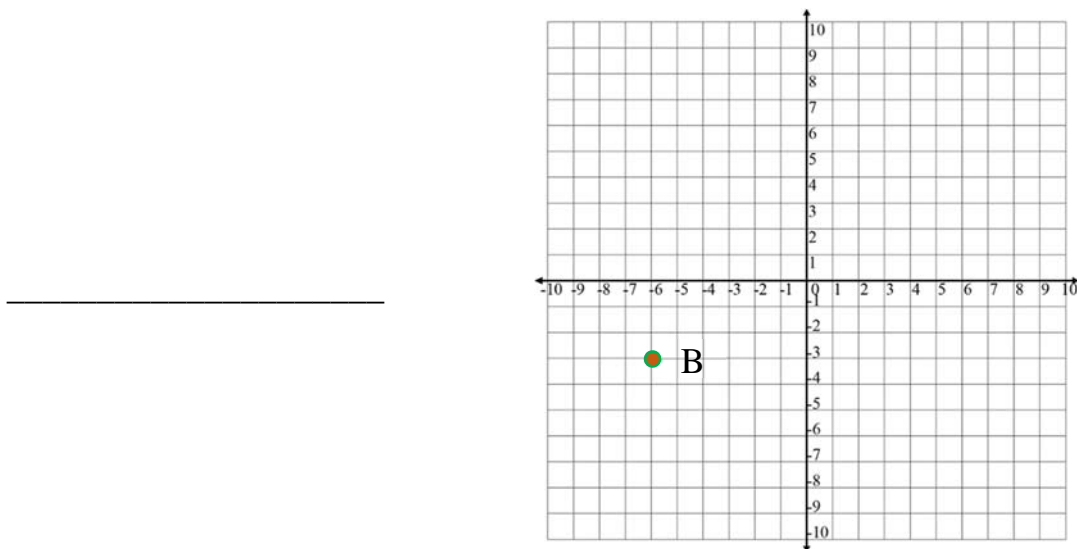
- A Cost(\$)= 0, 3.15, 6.30, 9.45
- B Cost(\$)= 0, 3.15, 6.45, 9.30
- C Cost(\$)= 0, 3.15, 6.60, 9.45
- D Cost(\$)= 0, 3.15, 6.54, 9.35

Answer the following questions.

17. The point P at $(-3, -1)$ is rotated 270° clockwise around the origin. What are the coordinates of the resulting point?

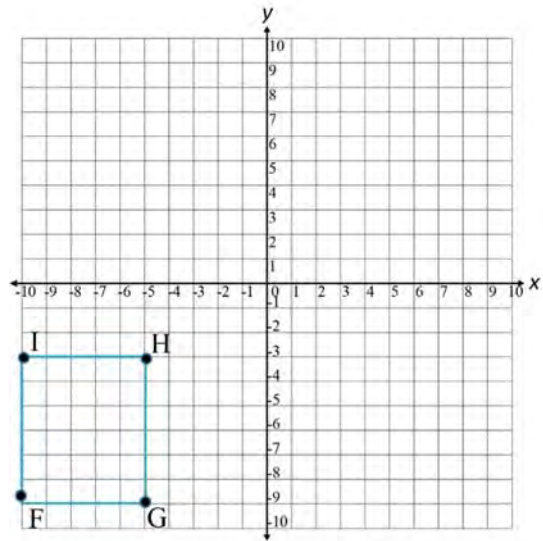


18. The point B at $(-6, -3)$ is rotated 270° counterclockwise around the origin. What are the coordinates of the resulting point?



Answer the following questions.

19. Graph rectangle FGHI after a translation that is 12 units right and 7 units up.



20. _____ is the movement of a geometric figure using rotation translations, and reflections.

- A Operation
- B Transversal
- C Symmetry
- D Transformation

1. On a scale drawing, a tree is $5\frac{3}{4}$ inches tall. The scale factor is $\frac{1}{20}$. Find the height of the actual tree.

2. Identify the scale factor

	Bird	Model
Wingspan (inches)	80	4

3. The scale factor of the model is 1:10. Find the missing dimension.

Item	Actual Dimension	Model Dimension
Grandfather clock	6.5 ft	

4. What is the surface area of a rectangular prism that has dimensions of 5 inches long, 5 inches tall, and 1 inch wide?

Find the diameter given the radius or determine the radius given the diameter.

5. $d = 32$ m

6. $d = 13$ in

7. $r = 7$ cm

8. $r = 8$ ft

9. Find the volume of a rectangular prism with the dimensions given below.
Length = 5 centimeters, Height = 6 centimeters, Width = 4.5 centimeters.
Volume = _____

10. How much water does a rectangular fish tank with a square base of 2.5 yards and a height of 4 yards hold? Volume = _____

7.D.1.1 Design simple experiments, collect data and calculate measure of central tendency (mean, median, and mode) and spread (range). Use these quantities to draw conclusions about the data collected and make predictions.

Real-World Connections

The central tendency you are most familiar with is the mean or average of your grades. You earn several grades; and they are added together. Now they are divided by the number of grades taken to give your average grade, or mean for these assignments. Another use for central tendency (mean, median, and mode) is during an experiment. First is collection of data and calculating the central tendencies. Finally, this information is used to draw conclusions and make predictions.

Vocabulary

experiments	a scientific procedure to make a discovery, test a hypothesis, or demonstrate a known fact
data	a collection of information
calculate	to work something out, a mathematical operation
measures	use of standard units to determine size or quantity: length, breath, height, area, mass, weight, volume, capacity, temperature and time
central tendency	central tendency refers to the measures of a data set, measures of central tendency include mean, median, and mode
mean	a measure of central tendency in a set of numerical data, computed by adding the values in a list and dividing by the number of values in the list
median	a measure of central tendency in a set of numerical data. The median of a list of values is the value appearing at the middle of a sorted version of the list, or the mean of the two central values, if the list contains an even number of values
mode	a measure of central tendency in a set of numerical data. The mode is the one that occurs the most times. If no numbers at least twice, there is no mode
range	the difference between the maximum and minimum values of a data set, a measure of the spread of the data spread
probability	the chance that a specific outcome will occur, measured as a ratio of the total of possible outcomes

spread	In statistics, spread describes the variability of a data set. Measures of spread include the range; quartiles, deciles, percentiles; the five-number summary; standard deviation and variance.
quantities	amount, number of, total, sum, size or extent; how much or how many
predictions	a reasonable guess of what will happen

Guided Practice (7.D.1.1)

Name _____

Find the mean, median, mode, and range. Round to the nearest whole number.

1. 58, 54, 60, 56, 52, 60, 58

2. 18, 17, 15, 5, 11, 9, 0, 50

Mean = _____

Mean = _____

Median = _____

Median = _____

Mode = _____

Mode = _____

Range = _____

Range = _____

Find the mean, median, mode, and range of the data set in the chart below.

Name	WS#1	Pg.3	Notes	Test	WS#2	Text 56	HW	WS#3	WS#4
Student X	100	95	80	85	56	100	92	88	74

3. _____

Mean =
_____Mode =
_____Median =
_____Range =

4. What conclusions can you draw from this information?

5. Predict what will happen if Student X received a zero or a 100 on the next assignment.

Complete the following problems.

6. What is the median of the following set of numbers?

40, 38, 36, 38, 35, 34, 37, 41, 33

- A 37
- B 38
- C 35
- D 43

7. What is the mean of the following set of data?

37.2, 8.4, 9.6

- A 17.0
- B 18.4
- C 19.4
- D 18.9

8. What is the mode for the following set of data?

84, 21, 48, 60, 48, 32, 60, 48, 80, 21, 84

- A 84
- B 21
- C 48
- D No Mode

Complete the following problems.

9. The table below shows the price of a computer at several stores.

Store	Computer Cost
A	\$2,056
B	\$2,013
C	\$2,036
D	\$2,136
E	\$1,783
F	\$1,913
G	\$1,883
H	\$1,972

What is the range of the computer prices?

10. How will the range of computer prices change if two computers priced at \$1,987 and \$2,135 are added to the table?

7.D.1.1 Design simple experiments, collect data and calculate measure of central tendency (mean, median, and mode) and spread (range). Use these quantities to draw conclusions about the data collected and make predictions.

Answer the following.

1. Find the median in this data set:

94, 52, 68, 55, 47, 14, 88, 92, 50

2. Find the median in this data set:

50, 20, 30, 40, 10, 70, 80, 70, 90, 100

3. Find the mode and range of the data set below:

127, 75, 25, 64, 183, 64, 183, 64, 90, 45, 90, 64

Mode: _____

Range: _____

4. If the number 81 is added to this set of data, how is the mean affected?

18, 22, 20, 17, 28

5. Find the median in this data set:

49, 52, 86, 55, 74, 41, 88, 29, 5

6. Find the median in this data set:

25, 35, 15, 25, 70, 20, 10, 50, 100, 90

Answer the following.

7. Find the mode and range of the data set below:

168, 29, 67, 75, 30, 175, 88, 99, 75, 19

Mode: _____

Range: _____

8. Javon's first 3 quizzes had a mean score of 90%. If he scores 46% on his next quiz, what will be his mean quiz score for these 4 quizzes?

9. Find the mean, median, mode, and range of this set of data:

Test Scores									
90	100	85	90	80	90	100	80	90	90

Mean: _____

Median: _____

Mode: _____

Range: _____

10. What is the effect of adding an outlier of 10?

Choose the best answer.

11. What is the median of the following set of numbers?

15, 19, 19, 37, 33, 33, 33, 22, 26, 28, 30, 30

- A 27
- B 28
- C 29
- D 30

12. What is the mean of the following set of numbers?

27.6, 4.5, 12.6

- A 14.9
- B 15.9
- C 14.4
- D 15.4

13. Dave has the following data: 13, 13, 19, a , 17

If the mean is 16, what is the value of a ?

- A 8
- B 16
- C 6
- D 18

Complete the following problems.

14. Find the range for the following set of data.

80, 84, 80, 95, 79, 69, 60, 70

15. If a sixth test score of 64 is added to the list of scores below, how would the mean be affected?

98, 90, 93, 95, 94

Independent Practice (7.D.1.1)

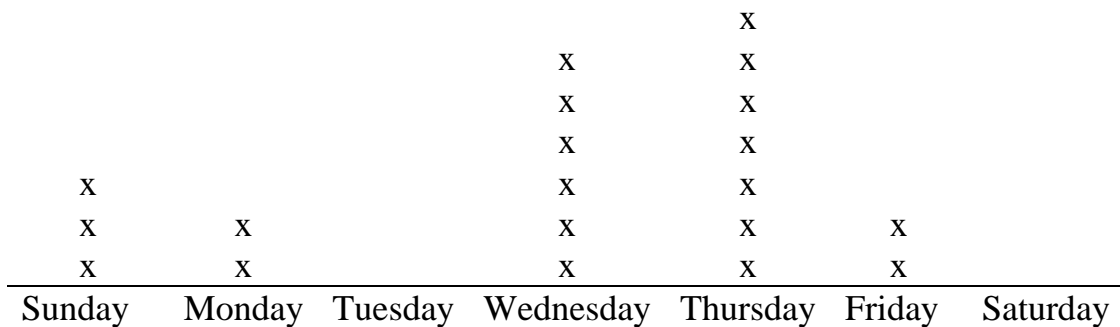
Name _____

Complete the following problems.

16. How would the range of the following set of numbers change if 27 replaced 22?
32, 40, 47, 47, 32, 22, 73, 77

17. How would the median of the following set of numbers change if 71 replaced 94?
92, 77, 92, 94, 36

18. A reporter looked through his journal to see how many people he had interviewed in the past week and made a line plot.



What is the mode? _____

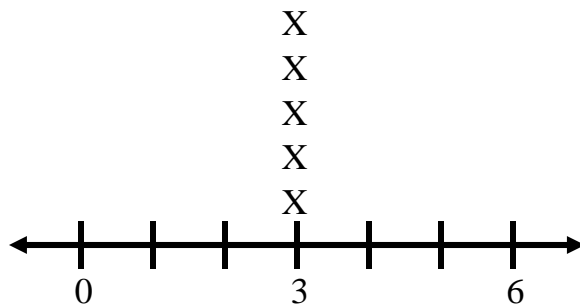
19. The table below shows the number of dogs to visit a dog park each week for a month.

Week	Number of Dogs
1	37
2	48
3	26
4	32

What is the median number of dogs to visit the dog park each week? _____

Complete the following problems.

20. Look at the data set.



A. What is the mean?

B. What is the median?

C. What is the mode?

What do you predict will happen to the mean, median, and mode if the number 15 is added to this data set? Don't calculate, just predict.

D. The mean will _____.

E. The median will _____.

F. The mode will _____.

Now, add the number 15 and calculate.

G. The new mean is _____.

H. The new median is _____.

I. The new mode is _____.

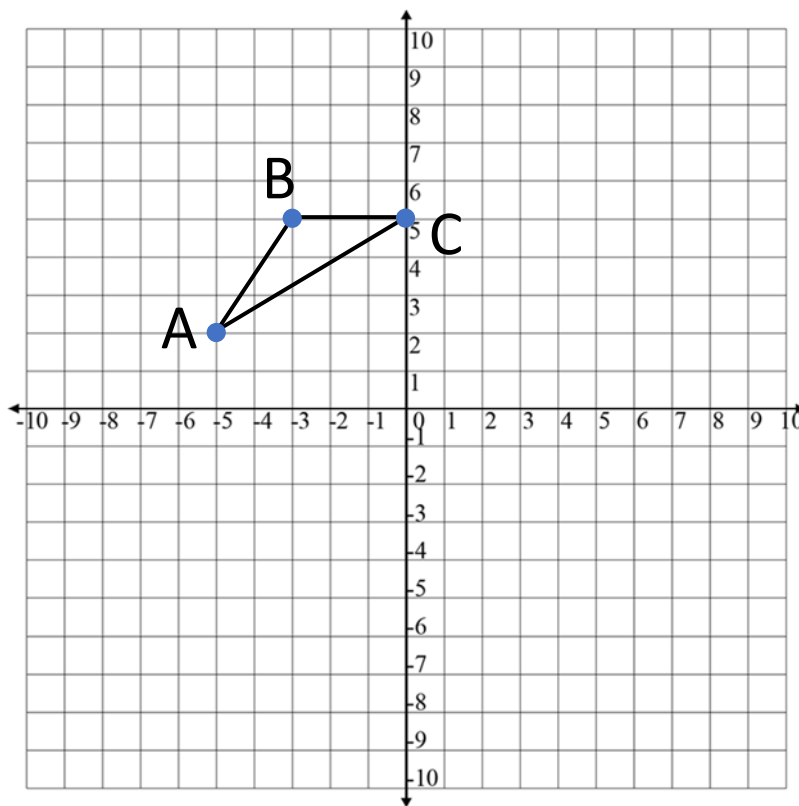
Evaluate.

1. $49 \div 7 - 3 \times 3 =$ _____
2. $82^0 - 1 + 4 \div 2^2 =$ _____
3. $18 \div (6 + 3) - 12 =$ _____
4. $4(-8) \times 4 =$ _____

Draw the following reflection and record the new coordinates of the reflection.

5. Reflect figure ABC across the x -axis. Label vertices A'B'C', so point A' is the reflection of point A, B' is the reflection of point B, and C' is the reflection of C.

A' = _____ B' = _____ C' = _____



Answer the following question.

6. Two rectangles are similar. The smaller rectangle is 5 centimeters \times 12 centimeters. The length of the second rectangle is 8 centimeters greater than twice the width of the smaller rectangle. Find the length and width of the larger rectangle.

Complete the following problems.

7. Calculate the area of a circle with a diameter of 26 inches. Give your answer in terms of pi.

8. If the circumference of a circle is 78.5 inches, find its radius.

9. Margaret wants to paint the top of her old desk. The surface of her desktop is 183 centimeters long and 61 centimeters wide. What is the area of her desktop?

10. Evaluate:

$$(1 + 2)^2 \times (3 - 1)^2 \div 2$$

7.D.1.2 Use reasoning with proportions to display and interpret data in circle graphs (pie charts) and histograms. Choose the appropriate data display and know how to create the display using spreadsheets or other graphing technology.

Real-World Connections

Charts and graphs are everywhere you look. They are in magazines and on TV. They are used to make data easier to read. Charts and graphs are a visual representation of data. Knowing which graph to use and how to create the graph using spreadsheets or other graphing technology is a valuable tool for many businesses.

Vocabulary

interpret data	provide meaning to facts
pie chart	a graph using a divided circle where each section represents a percentage of the total. May also be called a circle or sector graph.
spread	in statistics, spread describes the variability of data set; measures of spread include the range; quartiles, deciles, percentiles; the five-number summary; standard deviation and variance
histogram	a type of bar graph used to display the distribution of measurement data across a continuous range.
spreadsheet	<p>a spreadsheet is a computer program which is used to organize and manipulate data.</p> <ul style="list-style-type: none"> • A spreadsheet displays a table where the data is entered cells arranged in columns and rows. • Each cell has a column letter and a row number, e.g. B4, D6. • Spreadsheets are like a calculator because formulas can be applied to the cells to make calculations. • Calculations in one section can be linked to other sections, so all the data in the spreadsheet updates as new entries are made. • Most spreadsheet programs also have a graphing or charting function, so data can be displayed visually.
graphing technology	using machinery and equipment developed from the application of scientific knowledge to represent by means of a graph.

The 7th grade did a survey on the number of cell phones each student had in their immediate family. The following table gives the data for each student from the survey.

Number of Cell Phones In Each Student's Family

5	3	6	6	2	5	4	0	7	1	2	2	2	3	3	6	4	2	2	5	5	6	3	5	4	5	5
2	1	4	5	5	4	3	2	2	4	5	3	2	4	6	7	4	3	3	2	1	3	3	4	5	7	6
4	3	5	5	3	4	2	1	0	5	5	4	5	7	6	4	3	2	2	3	4	5	5	4	6	4	5

1. Fill in the frequency table.

Number of Cell Phones	Frequency

2. Fill data for the histogram

Number of Cell Phones in Each Family				
40				
30				
20				
10				
0				
	0-1	2-3	4-5	6-7

Number of Phones

3. Use web based histogram program or other graphing technology such as Excel[®] or Google Sheets[®] as instructed by your teacher to create the above histogram.

Guided Practice (7.D.1.2)

Name _____

Circle graphs (also called pie charts) represent data in percentages. The parts should always add up to 100%. To calculate the value of a percentage circle graph, multiply the percent by the total. To calculate the percent use $\frac{\text{part}}{100}$.

Create a pie chart using the following data chart of the favorite food of 350 individual students.

4. Calculate percent and round to the nearest tenth.

Favorite Food	Number of Students	Percent
pizza	250	
ice-cream	10	
hamburgers		10%
chocolate	5	
tacos	50	

5. You can use the free online graphing program provided by NCES at <https://nces.ed.gov/nceskids/createagraph/> or use other graphing technology as instructed by your teacher to create the circle graph.

6. A farmer counted the number of apples on each of his trees.
Use the data in the table to make a histogram.

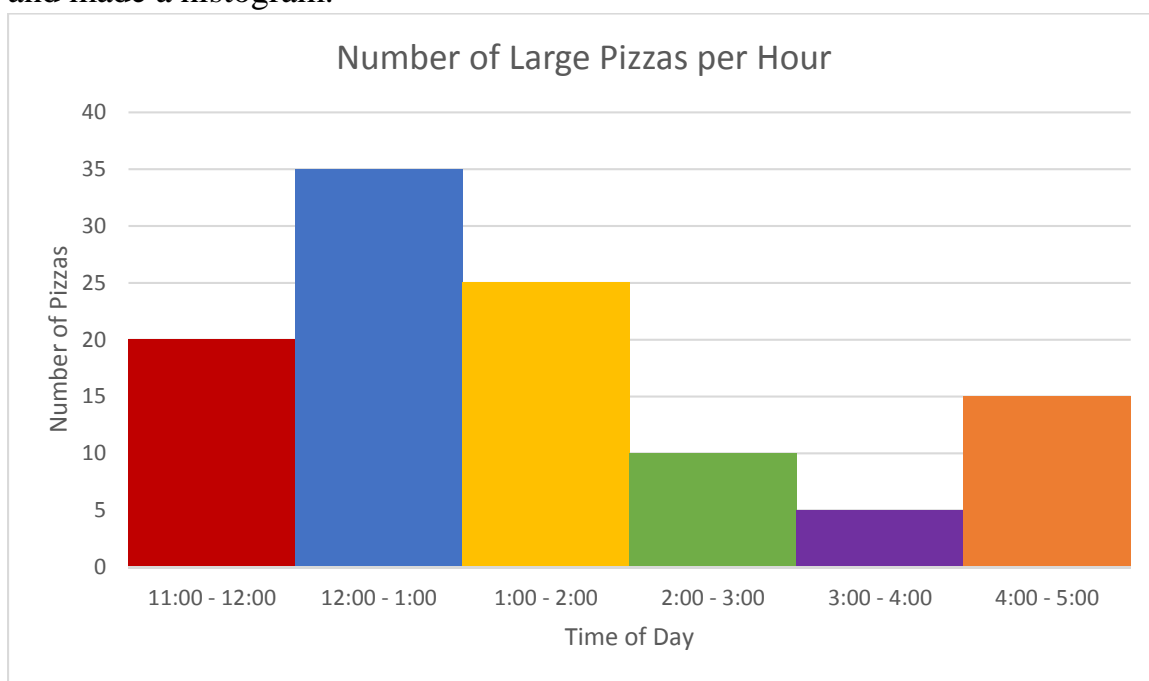
Number of	
Apples	Trees
0-4	20
5-9	10
10-14	30
15-19	40
20-24	50

Number of apples on trees					
50					
40					
30					
20					
10					
	0-4	5-9	10-14	15-19	20-24

Number of apples

Answer the following questions.

7. Coach Ralston recorded how many miles each person on his cross-country team could run. If he wanted to determine how many teammates could run between 6 and 8 miles, which type of graph would he use?
- A line plot
 - B histogram
 - C circle graph
 - D line graph
8. A pizza restaurant manager counted the number of large pizzas sold per hour and made a histogram.



How many large pizzas were sold from 11:00 a.m. – 5:00 p.m.?

9. What type of graph would a math teacher use to show her students improvement in math test scores over a year's time?
- A line plot
 - B histogram
 - C circle graph
 - D line graph

Answer the following question.

10. Mary and Steve own a local diner. They sold a total of 400 food items on Saturday. The table below shows the number of different food items sold.

Food Item	Number of Items
Burger	100
Salad	20
Fried Chicken	200
Homemade Pie	80

Create a circle graph to correctly show the information from the table.

7.D.1.2 Use reasoning with proportions to display and interpret data in circle graphs (pie charts) and histograms. Choose the appropriate data display and know how to create the display using spreadsheets or other graphing technology.

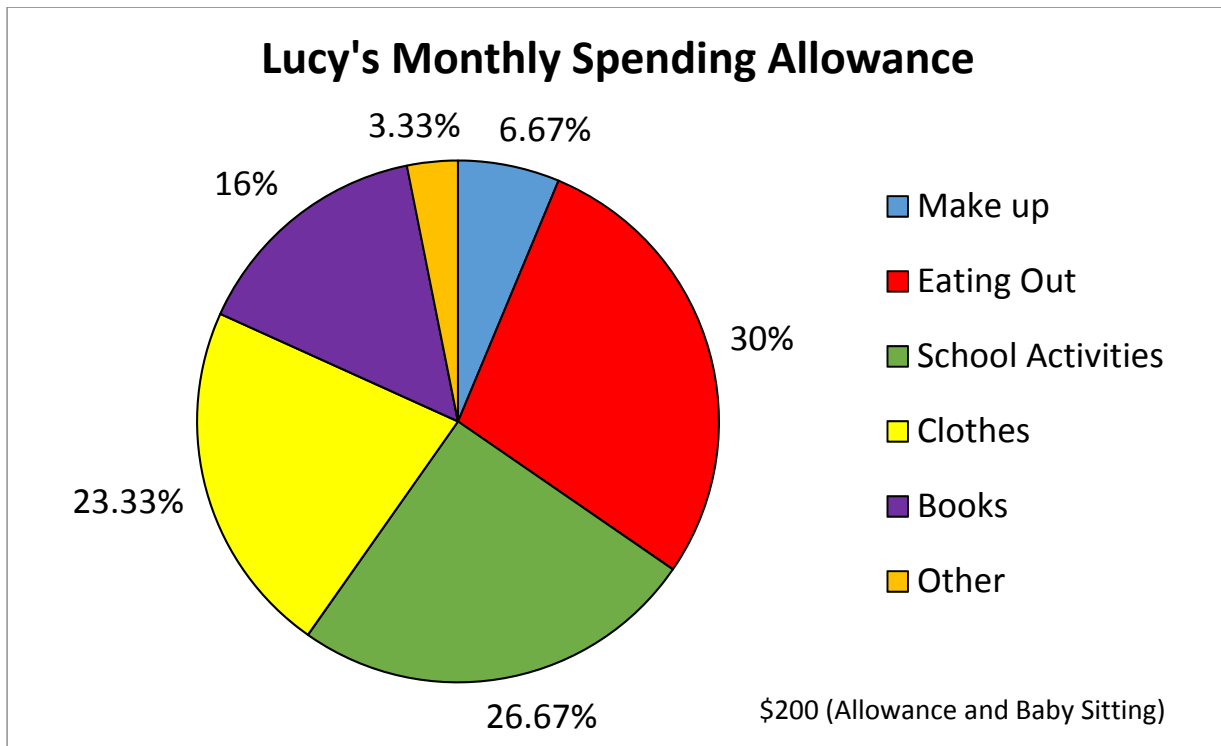
Calculate the value of a percent from the circle graph below.

1. How much did Lucy spend each month on eating out?

3. How much did Lucy spend each month on books?

2. How much did Lucy spend each month on clothes?

4. How much did Lucy spend each month on school activities?



Independent Practice (7.D.1.2)

Name _____

Complete the following problems.

The 7th grade did a survey on the number of hours each student plays video games. The following gives the data produced by the survey.

Number of Hours Playing Video Games per Student

2	3	6	6	2	5	4	0	7	1	2	2	2	3	3	6	4	2	2	5	2	6	3	5	4	5	5
2	1	4	5	3	4	3	2	2	4	7	3	2	4	1	0	4	3	3	2	1	3	3	2	5	7	6
4	4	2	5	3	4	2	1	0	1	5	4	5	3	6	4	3	2	2	3	4	2	1	4	6	4	5

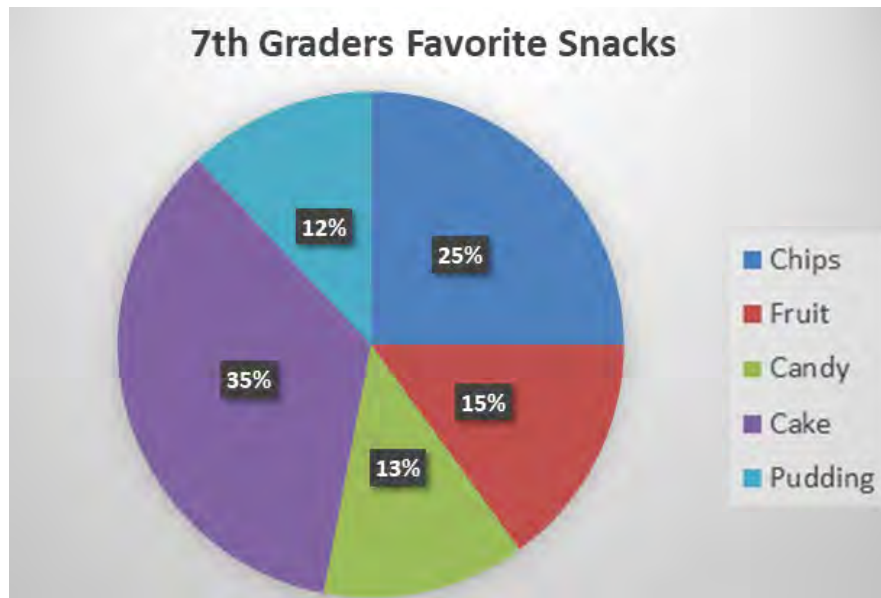
5. Fill in the frequency table.

Number of Hours Playing Video Games	Frequency

6. Fill in the histogram

Number of Hours Playing Video Games per Student				
Number of students (Frequency)	40			
	30			
	20			
	10			
	0			
	0-1	2-3	4-5	6-7
Number of Hours Playing Video Games				

Use the circle graph below to answer questions 7-9.



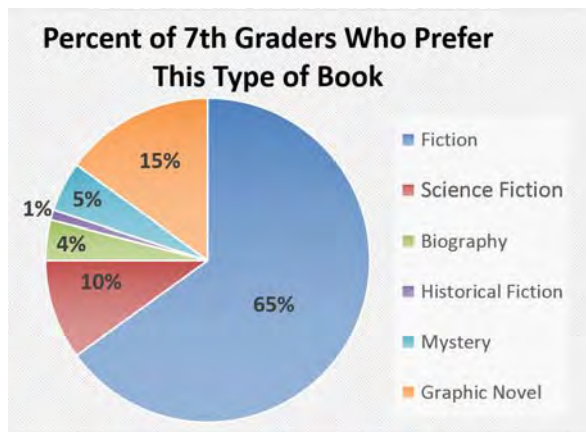
7. If 500 students were surveyed, how many prefer chips as a favorite snack?
- A 400
 - B 150
 - C 125
 - D 175
8. How many students prefer candy and cake?
- A 65 Students
 - B 175 Students
 - C 100 Students
 - D 240 Students
9. How many students prefer fruit and pudding?
- A 60 Students
 - B 135 Students
 - C 75 Students
 - D 65 Students

Complete the following problems.

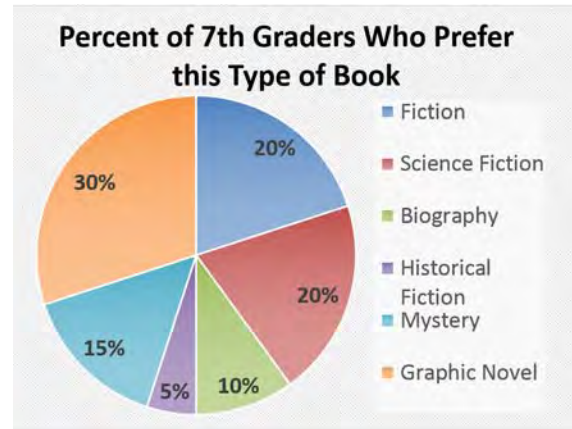
Favorite Type of Book	Percent of 7 th Graders Who Prefer This Type of Book
Fiction	30 %
Science Fiction	15 %
Biography	5 %
Historical Fiction	10 %
Mystery	20 %
Graphic Novel	20 %

10. Which graph below accurately shows the information from the chart above?

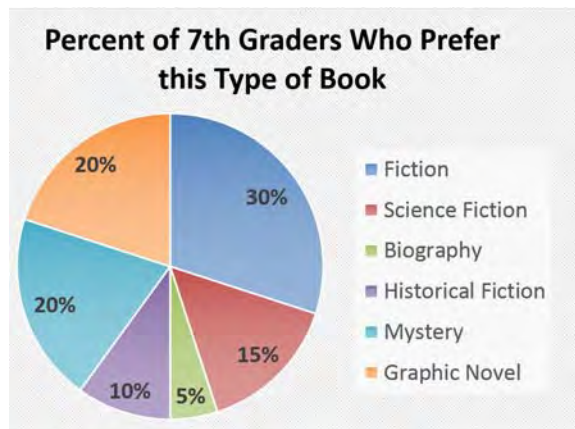
A



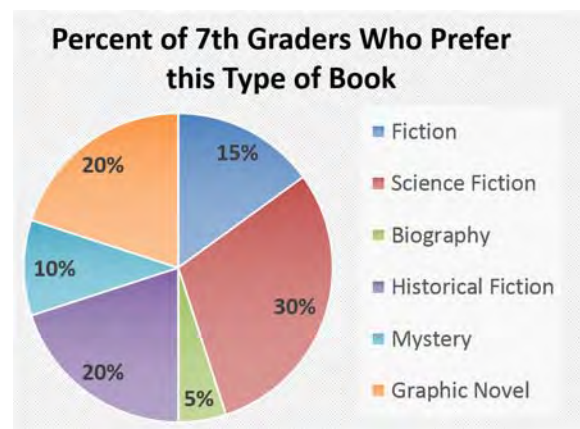
B



C



D



Complete the following problems.

11. A pet owner counted the number of hermit crabs in each tank. Use the data to create a histogram.

Hermit Crabs per tank

6, 16, 13, 4, 6, 15, 2, 0, 8, 10, 2

12. Which type of graph would be best for showing the percentage of students in each grade level at a middle school?

A line plot

B histogram

C circle graph

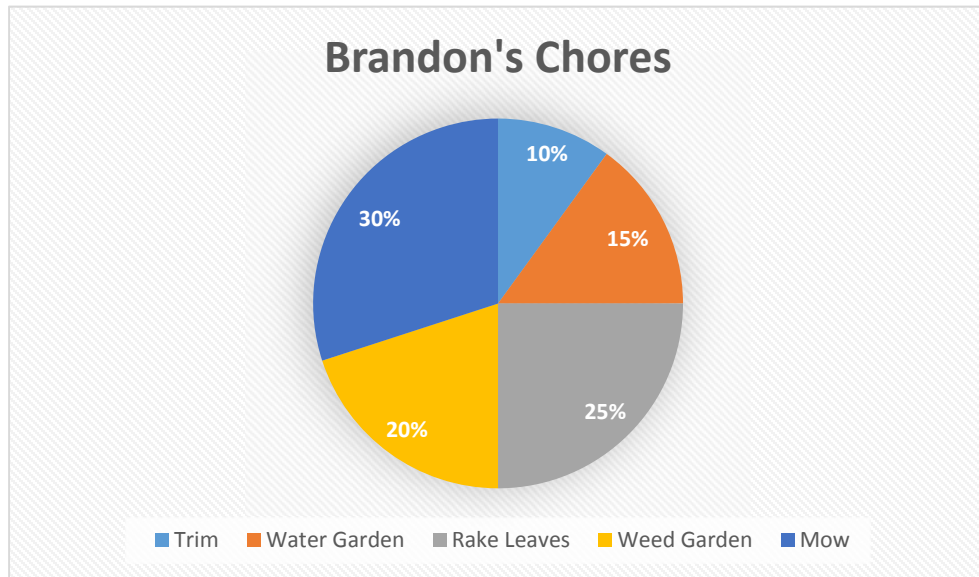
D line graph

13. The table below shows how much time it takes for a group of students to travel to school in one week. Create a histogram to match the table.

Time (minutes)	1-5	6-10	11-15	16-20
Number of Students	3	15	12	8

Complete the following problems.

14.



If Brandon spent 40 hours total doing yard chores, how many hours did he spend watering the garden?

- A 8 hours
- B 6 hours
- C 10 hours
- D 15 hours

15. About how many hours did Brandon spend on mowing and raking?

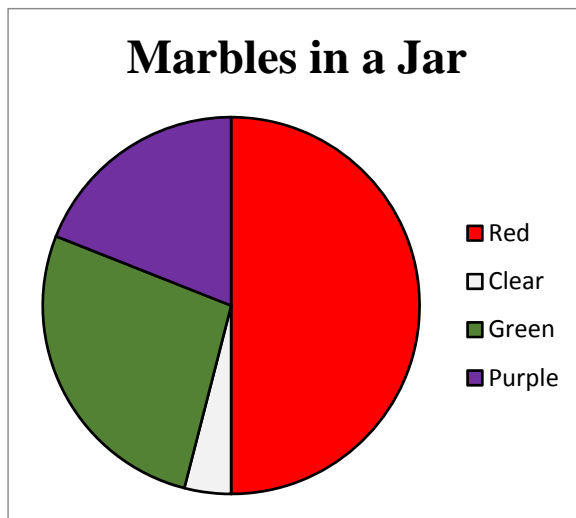
Which circle graph correctly shows the information from the table?

16. A jar holds 100 marbles. The table below shows the different colors of marbles in the jar.

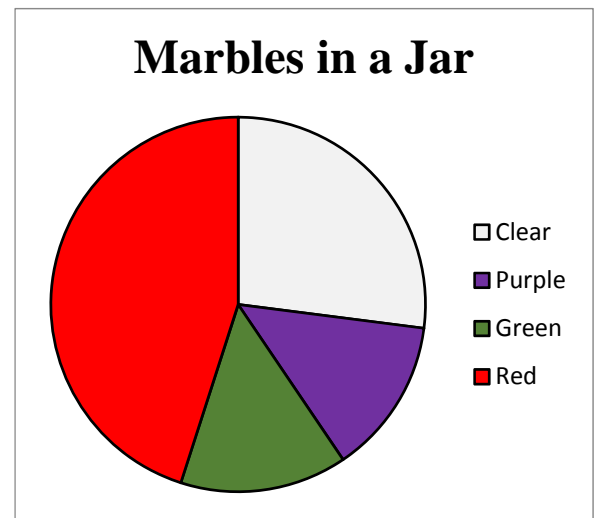
Marbles in a Jar

Color	Number
Green	27
Purple	19
Clear	4
Red	50

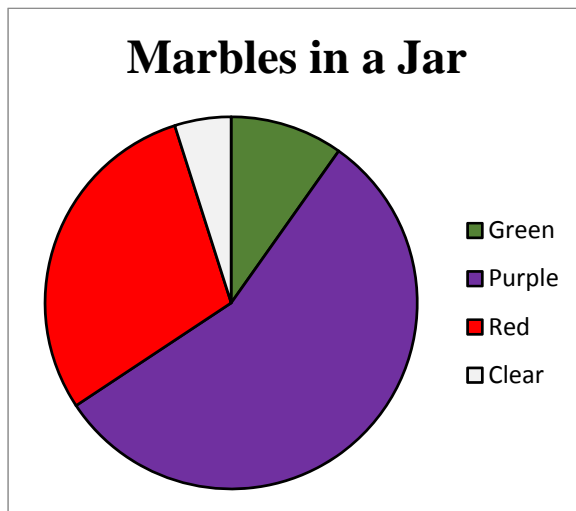
A



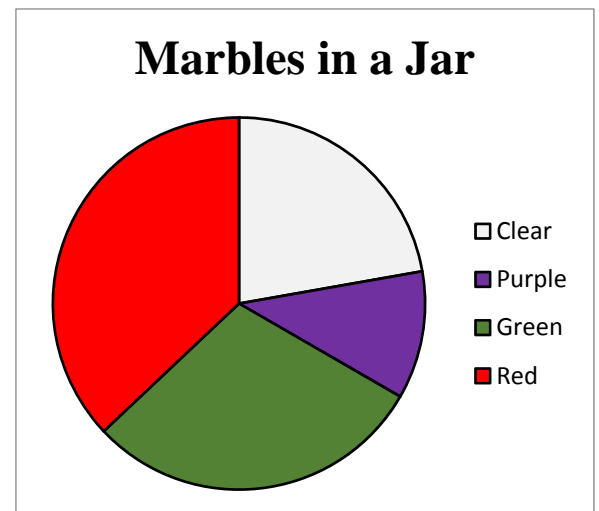
B



C



D



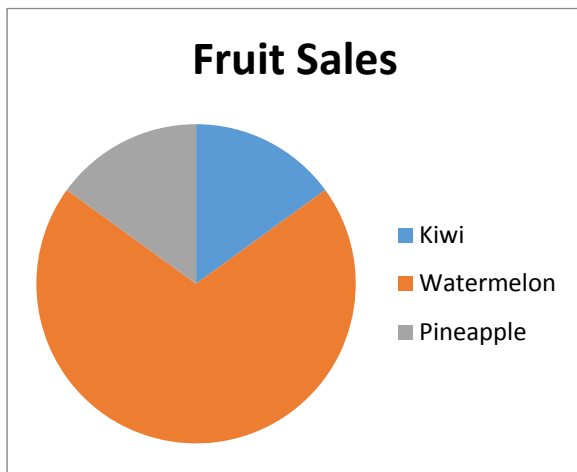
Choose the best answer.

17. Alyssa surveyed 50 7th graders to find what summer fruit is the favorite. The results are shown in the table below.

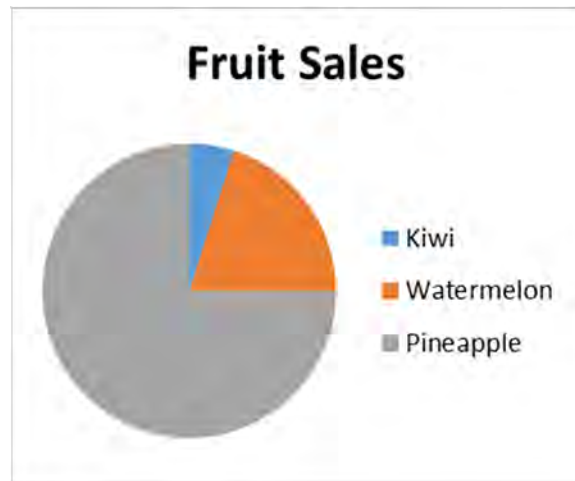
Fruit	Percentage of Students
Pineapple	20%
Watermelon	75%
Kiwi	5%

Which circle graph best displays her data?

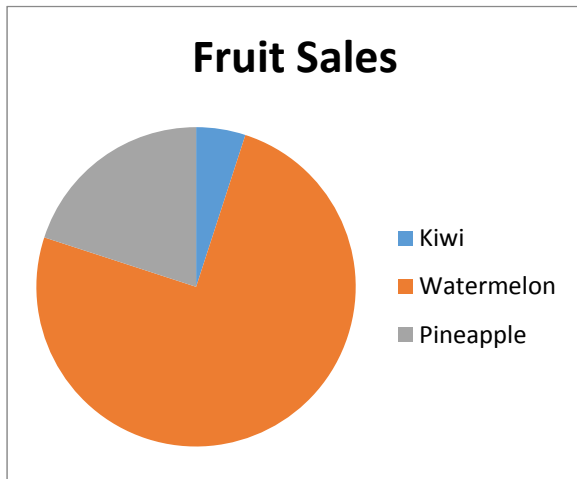
A



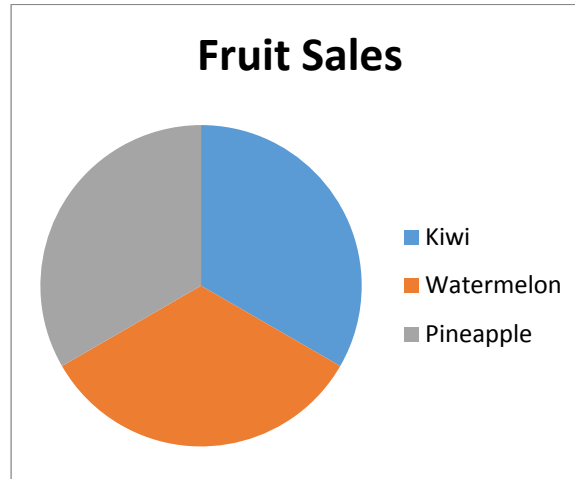
B



C

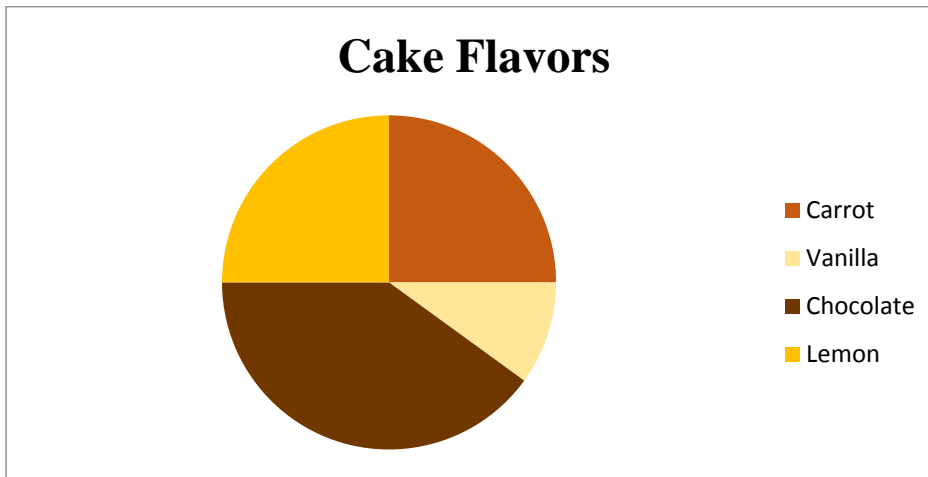


D



Choose the best answer.

18. The baker at Sweeties made a circle graph to display her customers' favorite cake flavors.



Which table did she use to make her circle graph?

A

Lemon	25%
Chocolate	50%
Vanilla	15%
Carrot	10%

B

Chocolate	50%
Lemon	10%
Carrot	25%
Vanilla	25%

C

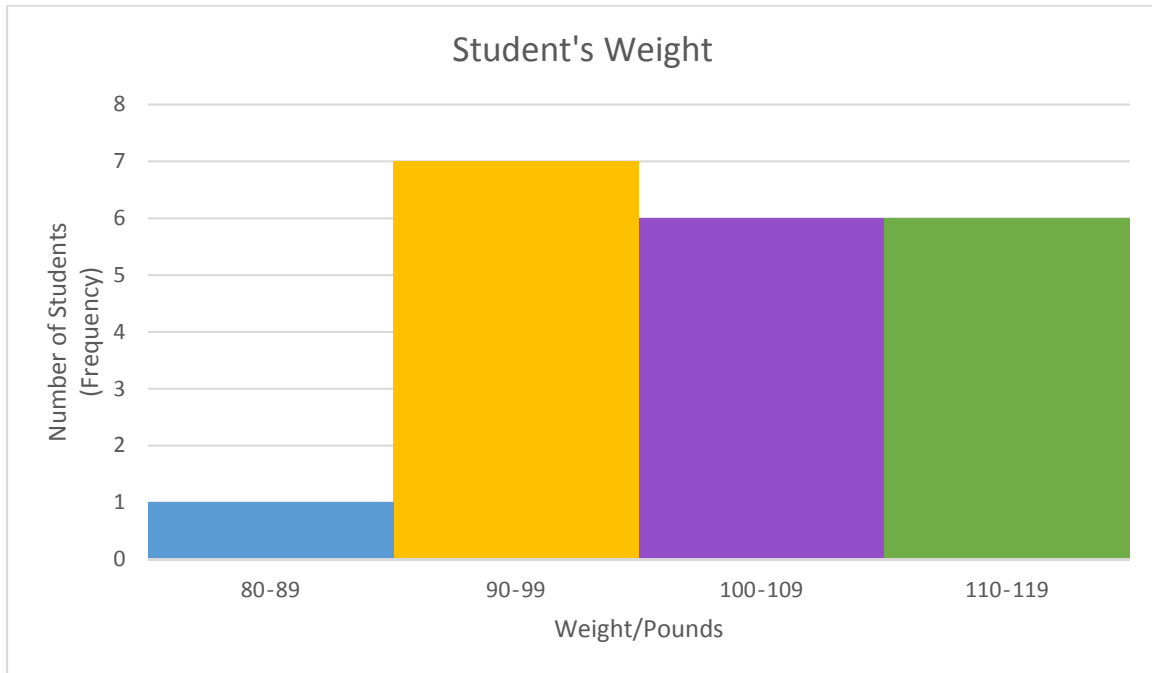
Carrot	25%
Vanilla	25%
Lemon	25%
Chocolate	25%

D

Vanilla	10%
Carrot	25%
Lemon	25%
Chocolate	40%

Answer the following questions.

19. The histogram below shows the number of students and their weights.



Which set of data was used to create the histogram?

- A. 113, 111, 103, 103, 89, 98, 98, 105, 117, 116, 96, 96, 96, 101, 107, 115, 118, 90, 91, 104
- B. 106, 106, 105, 108, 87, 94, 92, 89, 85, 115, 118, 93, 93, 93, 111, 113, 86, 93, 91, 93

20. If four students' weights of 101, 107, 107, and 108 were added to the data set, how would the histogram change?

Answer the following questions.

1. Solve and graph the inequality $\frac{1}{3}x < 9$.

$x =$ _____

Practice finding the mean (average). Round to the nearest hundredths if necessary.

2. Prices paid for lunch: \$4.99, \$5.99, \$12.99, \$3.25, \$10.00, \$2.56

Mean = _____

3. Temperatures last week: 102° , 98° , 99° , 100° , 100° , 97° , 97°

Mean = _____

4. Money spent on school supplies: -\$42, -\$37, -\$5, -\$15

Mean = _____

Find the area and perimeter of the following rectangles to complete the chart below.

$$A = lw \text{ or } A = bh$$

$$P = 2l + 2w$$

Base	Height	Area	Perimeter
5. 4 m	23 m		
6. 25 ft	15 ft		
7. 42 yds	12 yds		

Calculate the Percent Increase or the Percent Decrease.

When finding percent increase or decrease, you must first identify the original number and then the change $\frac{\text{change}}{\text{original}}$.

8. Mrs. Hall had a total of 20 students in her 3rd hour math class. The next day she had 15 students. What is the percent decrease in the number of students in her math class?

9. The middle school girls' softball team only won 14 games last year. This year, they won 26 games. What is the percent increase of games won this year over last year?

10. Andrew had \$75.00 in his piggy bank. He decided to buy a new video game for \$29.00. Is this a percent increase or decrease?

7.D.2.1 Determine the theoretical probability of an event using the ratio between the size of the event and the sample space; represent probabilities as a percent, fraction, and decimal between 0 and 1.

Real-World Connections

If you have watched the start of a football game, you were watching probability in action when they tossed the coin. A coin has two sides: heads and tails. This is the possible outcomes or sample space. It is written $\{H, T\}$. The chance for heads is 1:2, the same for tails. There is a 50% chance to flip one or the other. This is theoretical probability and is determined by $P(\text{event}) = \text{number of favorable outcomes divided by number of possible outcomes}$, $P = \frac{\text{favorable outcomes}}{\text{possible outcomes}}$. If you flip the coin, it is an activity of chance; an experiment that can have different results each time.

$P \approx \frac{\text{number of times the event occurs}}{\text{total number of trials}}$. Probability is represented as a fraction, decimal, or percent.

Vocabulary

probability	<p>The chance that an outcome will occur, measured as a ratio of the total of possible outcomes</p> <ul style="list-style-type: none"> Experimental probability occurs when trials of probability experiment are run and data is collected. The experimental probability of desired outcome is the relative frequency of that outcome compared to the total number of possible outcomes Theoretical probability is the number of ways the event can occur divided by the total number of outcomes; it is finding the probability of events that come from a sample space of known equally likely outcomes
sample space	A probability model for a random process. A list of the individual outcomes that are to be considered
fraction	A number that expresses parts of a whole or set

Use the spinner to answer questions #1-2

1. Find the sample space, total number of possible outcomes.

2. What is the probability of landing on 2? Write as a fraction, decimal, and percent.



Use what you know about probability to answer the questions below.

3.

A box of chocolates has 6 caramels, 4 nut clusters, 5 chocolate cremes, 2 dark chocolate coconuts, 3 almond nuggets, 4 cherry cordials; a total of 24 candies in all.

- a. What is the probability (fraction) you will choose a cherry cordial?

- b. What is the probability (percent) you will not choose an almond nugget?

Some problems use the word “and”, in this case calculate each probability and multiply.

4. Cassie has two bags of cookies. The first bag has 5 peanut butter cookies and 5 oatmeal. The second bag has 2 peanut butters, 3 oatmeal, and a chocolate chip cookie. What is the probability of Cassie reaching into bag 1 and getting an oatmeal and reaching into bag 2 and getting a peanut butter?

Some problems use the word “or”, in this case calculate each probability and add.

5. Refer to the spinner in question 1. What is the probability of spinning a 2 or 3?

6. A quarter is tossed 18 times with the results being either heads or tails. How many times should the result be heads?

Complete the following problems.

7. A bag contains 16 marbles. Six of the marbles are blue. What is the probability a random selected marble will be blue? Write your answer as a fraction in lowest terms and as a percent.

8. Using the information from question 7, what is the probability a randomly selected marble will not be blue? Give your answer as a fraction in lowest terms and as a percent.

9. If a laundry basket contains 21 total socks and 4 are red, what is the probability of randomly choosing a sock that is not red out of the basket? Give your answer as a percent rounded to the nearest tenth.

10. Your friend picks at random a card from the following.



What is the probability a card greater than 4 will be picked? Give your answer as a percent.

7.D.2.1 Determine the theoretical probability of an event using the ratio between the size of the event and the sample space; represent probabilities as a percent, fraction, and decimal between 0 and 1.

Use what you know about theoretical and experimental probability to answer the following questions. Express as a percent, fraction, and decimal.

Outcome	TH	TT	HT	HH
Frequency	24	35	23	18

1. The chart above represents an experiment of flipping two coins at the same time 100 times. Find the theoretical probability of flipping the coins and one landing on tails and one landing on heads.

2. Find the experimental probability of flipping the coins and one landing on tails and one landing on heads.

3. Compare the two values.

Read each of the problems below and answer the questions.

4. Connor throws two six-sided number cubes. What is the probability he will roll a 2 and 5?

5. Ella spins a spinner divided into 8 equal sections numbered 1-8. What is the probability she will not spin an even number? Express as a fraction, decimal, and percent.

The information below shows the ages of 10 children at a daycare center. Use the table to answer the following questions.

Daycare Attendance	
Age (years)	Number of Children
2	3
3	2
4	1
5	3
6	1

6. What is the probability the last two children to leave in the evening are 5 years old?

7. What is the probability that a 6-year-old or two-year-old will arrive first in the morning?

8. On Sunday, the weatherman reported the chances of rain this week are Thursday at $\frac{1}{3}$, Friday at $\frac{1}{2}$, and Saturday at 25%. What is the chance it will rain all three days?

Answer the following probability questions.

9. The probability of reaching into a bag of marbles and pulling out a red marble is $\frac{3}{12}$. What is the probability of **not** pulling out a red marble on the first try?

10. If you flipped a two-sided coin twice, what is the probability of the coin landing on head both times?

Answer the following probability questions.

11. About how many times would it take to flip a penny heads up 25 times?

12. If you roll a regular 6-sided dice, what is the probability you will roll the number 5? Give your answer as a fraction in lowest terms and as a percent.

13. You pick a marble at random. What is the probability you will choose a red marble? Give your answer as a fraction in lowest terms and as a percent, rounded to the nearest tenth.



14. A laundry basket contains 16 socks of which 6 are white. What is the probability that a randomly selected sock will be white? Give your answer as a fraction in lowest terms.

15. Your friend randomly picks one of the following cards.



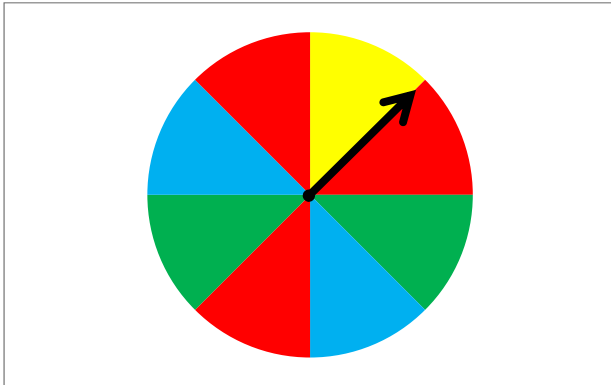
What is the probability that an odd numbered card will be picked? Give your answer as a repeating decimal percentage.

Answer the following probability questions.

16. Principal Parkhurst ordered a sandwich tray for her teachers. She had 5 ham sandwiches, 7 turkey sandwiches, and 4 chicken salad sandwiches. If Janie randomly picked a sandwich off the tray, which kind is she least likely to pick?

17. Using the information from question 16, what is the probability of randomly picking a ham sandwich? Give your answer as a fraction in lowest terms.

18.



What is the probability of the spinner landing on yellow or red?
Give your answer as a percent.

Answer the following probability questions.

19. The art class drew 40 different pictures for an art show. Twenty of the pictures include a dog. If the teacher shuffles the pictures and picks one at random, what is the probability the teacher will pick one that includes a dog?

A 0.5
B 0.2
C 0.1
D 1.0

20. If you roll a regular 6-sided dice, what is the probability you will roll a number that is not less than 4?

Give your answer as a fraction in simplest terms.

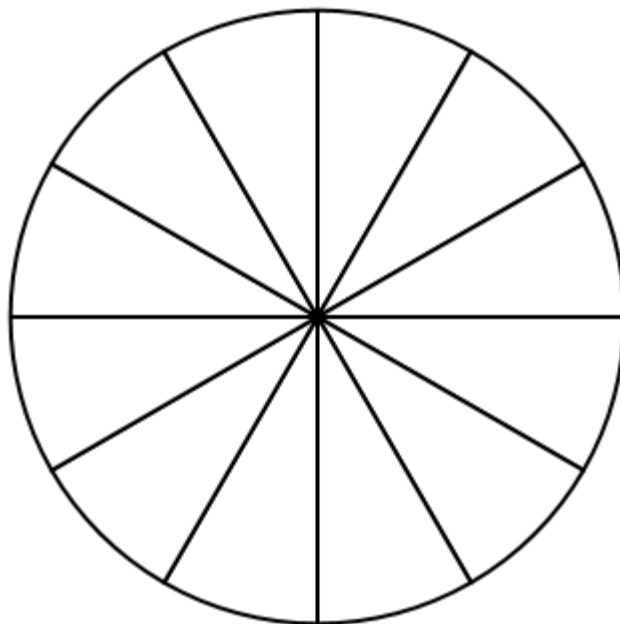
Write the property that describes each of the following statements.

1. $6 + 3 = 3 + 6$ _____
2. $3 + (7 + 4) = (3 + 7) + 4$ _____
3. $5(4 + 6) = (5)(4) + (5)(6)$ _____
4. $(6 \times 3) \times 2 = 6 \times (3 \times 2)$ _____
5. $a \cdot b = b \cdot a$ _____
6. $(m)(n \cdot p) = (m \cdot n)(p)$ _____

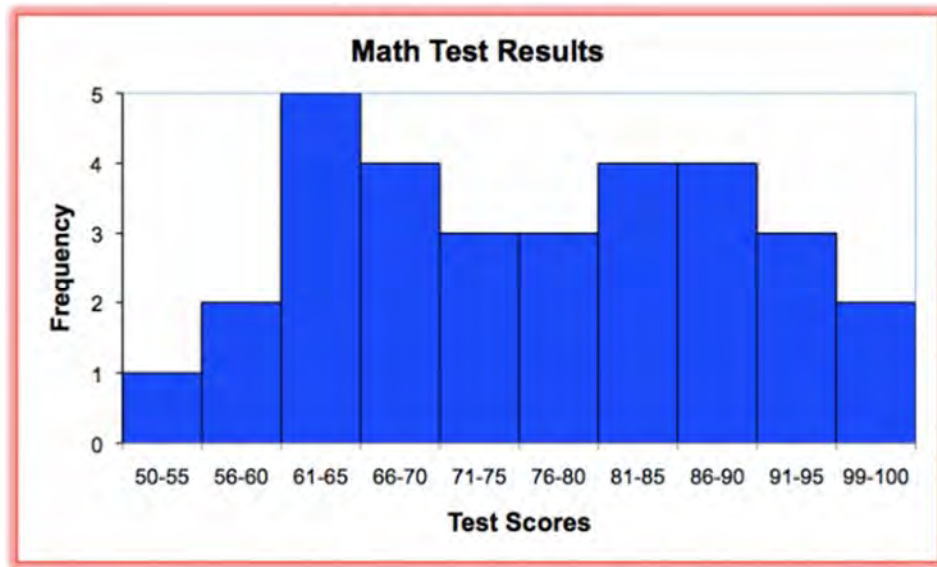
Nelson took a survey among his schoolmates to find the favorite beverage. He recorded the information in a table.

Soda	Milk	Juice	Sports Drinks	Water
28	7	14	14	21

7. Complete the pie chart using the information above. Label and color the calculated percentage.



Use the histogram below to answer the following questions.



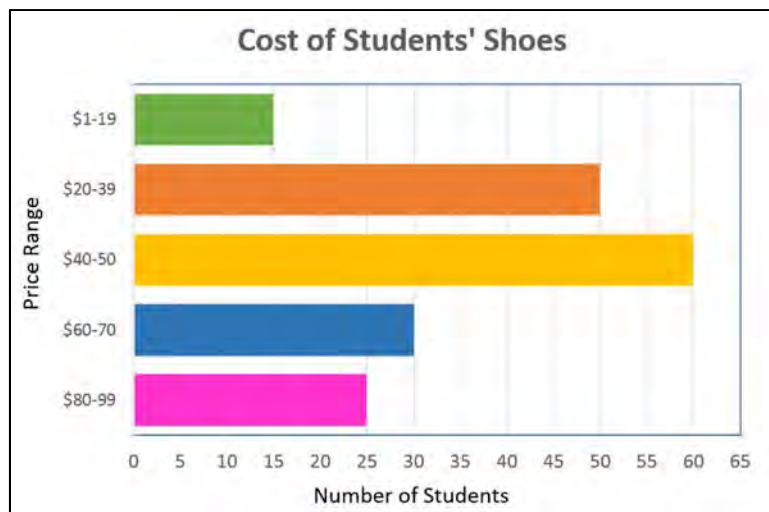
8. How many students were surveyed?

9. What were the test score ranges that had exactly four students?

Use the chart below to answer the following question.

10. According to the histogram, what price range of shoes is most popular with students?

How many total students were surveyed?



7.D.2.2 Calculate probability as a fraction of sample space or as a fraction of area. Express probabilities as percents, decimals, and fractions.**Real-World Connections**

Probability is the chance something will or will not happen. As you listen to the weather person at night, you might hear there is a 40% chance of rain tonight. That means there is a 60% chance it will not rain. What about a bag of green and blue marbles? There are 10 marbles in the bag. 5 marbles are green and 5 are blue. You reach in a bag and pull out 2 blue marbles. This is a $\frac{2}{10}$ or $\frac{1}{5}$ chance pull out a blue marble. This can be written as 0.20 or a 20% chance. This can also be demonstrated with area. For example, visualize a dart board (a circle) inside a square frame with the side length of 15 inches, what is the probability a random dart will land in the circle.

Vocabulary

decimals	a number in a number system based on 10, also known as the Base 10 system or Hindu-Arabic system which uses 10 digits to show all numbers... 0, 1, 2, 3, 4, 5, 6, 7, 8, 9
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Use the following information for problems 1-3: Given a circle within in a square with the side length of 15 inches, find the probability that a point chosen at random will land in the circle.

1. First, draw and label a diagram with the information provided in the above question.

Use the information from problem 1 to complete problems 2-3.

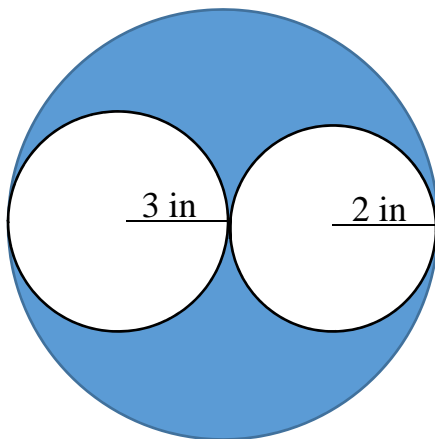
2. Complete the ratios.

$$\frac{\text{\# of favorable outcomes}}{\text{total outcomes}} = \underline{\hspace{2cm}} \text{ and in this case, } \underline{\hspace{2cm}}$$

3. Find the probability a point chosen at random will land in the circle by inserting the results into the probability ratio $\frac{\text{favorable area}}{\text{total area}} = \frac{\text{circle area}}{\text{square area}}$. Results should be given as a fraction, decimal, and percent rounding to the nearest whole number.

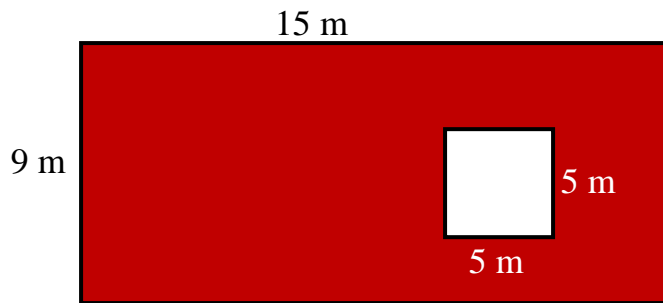
Complete the following probability problems.

4. Find the probability a randomly chosen point in the figure lies in the unshaded area. Give the solution as a fraction, decimal, and percent.



Complete the following probability problems.

5. Find the probability a randomly chosen point in the figure lies in the unshaded area. Give the solution in fraction, decimal, and percent forms.



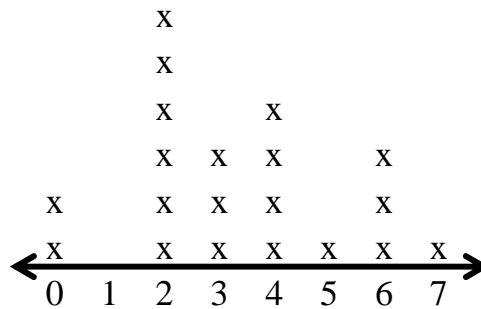
6. What is the probability of each outcome when a single 6-sided die is rolled?
Use Sample Space {1, 2, 3, 4, 5, 6}

7. What is the sample space for choosing an odd number from 1 to 11 at random?

- A 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11
B {1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11}
C {1, 3, 5, 7, 9, 11}
D {1, 11}

Complete the following probability problems.

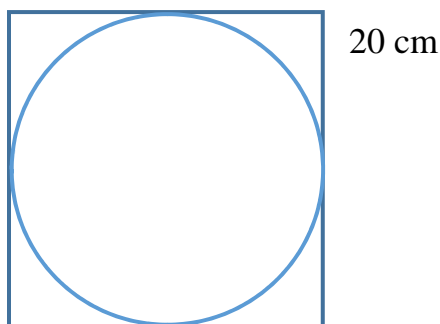
8. The following line plot shows the number of phone calls made in one day by students in Homeroom 109.



Based on the information in the line plot, what is the probability a student chosen at random made two or three phone calls that day?

- A $\frac{3}{20}$
 B $\frac{9}{20}$
 C $\frac{6}{19}$
 D $\frac{9}{10}$

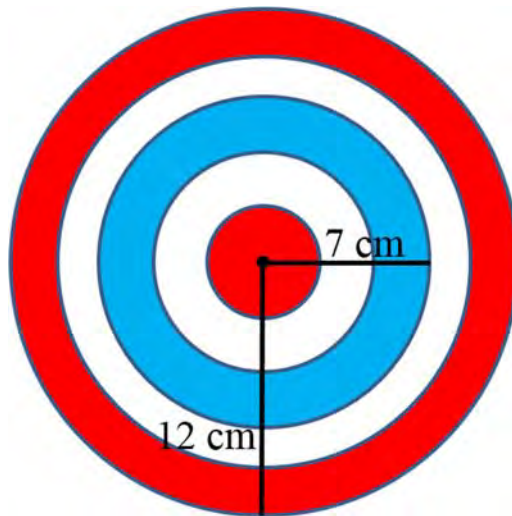
9. A circle within a square target with 20-centimeter sides. Find the probability of using a random method of selection for a point within the square that does not land within the circle.



Give your answer as a decimal.

Complete the following probability problems.

10.



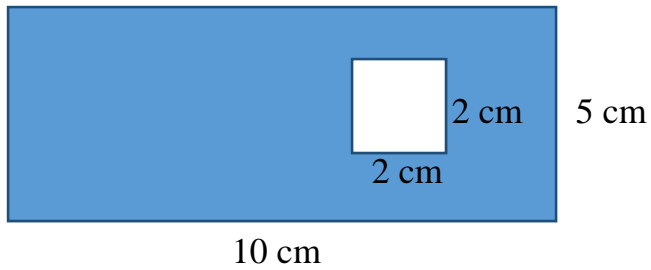
The goal in a game of darts is to throw three darts into the bullseye, or at least closer than your opponent!

What is the probability of using a random method of selection for a point in the area from the outside of the blue ring to the center of the circle? Give your answer rounded to the nearest whole percent.

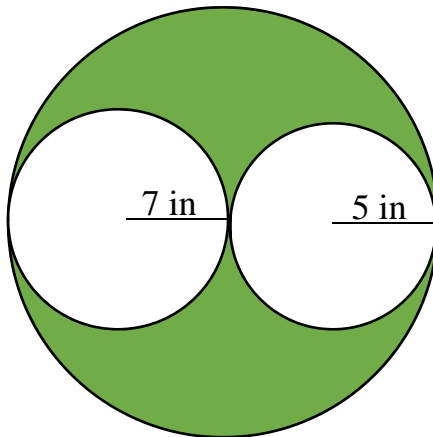
7.D.2.2 Calculate probability as a fraction of sample space or as a fraction of area. Express probabilities as percents, decimals, and fractions.

Find the probability a randomly chosen point in the figure lies in the unshaded region. Give all solutions a fraction, decimal, and percent.

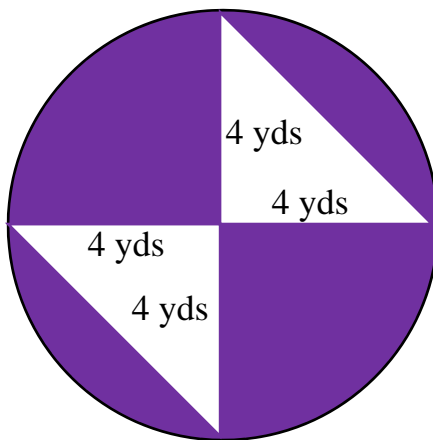
1. _____



2. _____

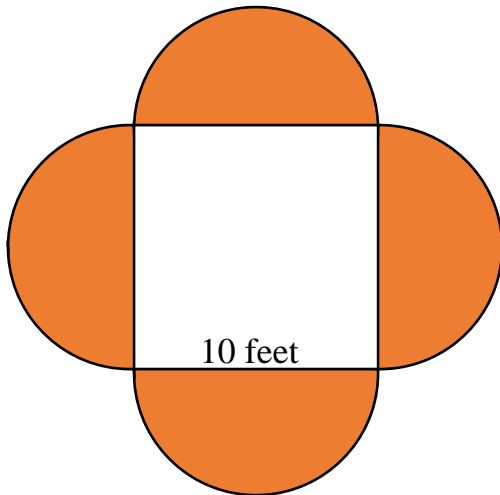


3. _____



Find the probability a randomly chosen point in the figure lies in the unshaded region. Give all solutions a fraction, decimal, and percent.

4. _____



Find the probability for each outcome on the game spinner shown at the right.

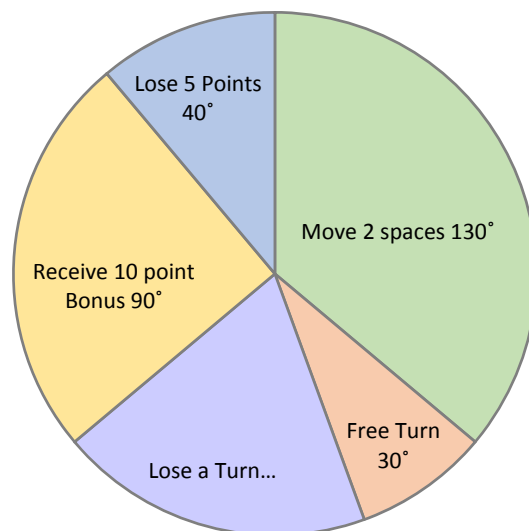
5. Receive a free turn

6. Lose a turn

7. Receive 10 bonus points

8. Move forward 2 spaces

9. Lose 5 points



Geometric Probability of Brownies

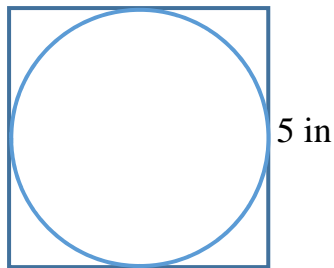
10. Julius makes a 13×9 pan of brownies. He sprinkles three different toppings on the pan. There are chocolate pieces on a 3×9 section, nuts on a 4×9 section, and coconut on a 6×9 section. Calculate the probability of randomly choosing a brownie with nuts on it. Record the result as a fraction, decimal, and percent.
- _____

Complete the following questions.

11. A spinner has 4 equal sized sections colored turquoise, teal, sky blue, and emerald. What is the probability of landing on each color after spinning this spinner? Include the sample space in your answer.
- _____
12. A glass jar contains 1 red, 3 green, 2 blue, and 4 yellow marbles. If a single marble is chosen at random from the jar, what is the probability of each outcome? Include the sample space in your answer.
- _____
13. What is the sample space for choosing a prime number less than 15 at random?
- A {2, 3, 5, 7, 11, 13, 15}
 - B {2, 3, 5, 7, 11, 13}
 - C {2, 3, 5, 7, 9, 11, 13}
 - D None of the above
14. What is the sample space for choosing 1 letter at random from the word DIVIDE?
- A {D, I, V, I, D, E}
 - B {1, 2, 3, 4, 5, 6}
 - C {D, I, V, E}
 - D None of the above

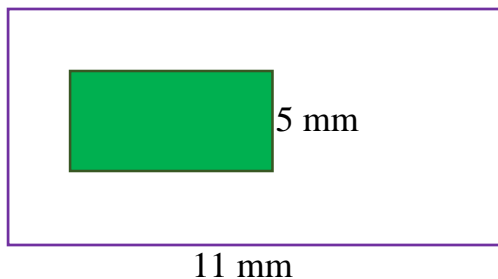
Complete the following questions.

15. A circle is within a square target with 5-inch sides. Find the probability that a dart landing randomly within the square lands inside the circle.



Give your answer as a decimal.

16. What is the probability of hitting a point within the green section chosen at random? Give your answer rounded to the nearest whole percent.



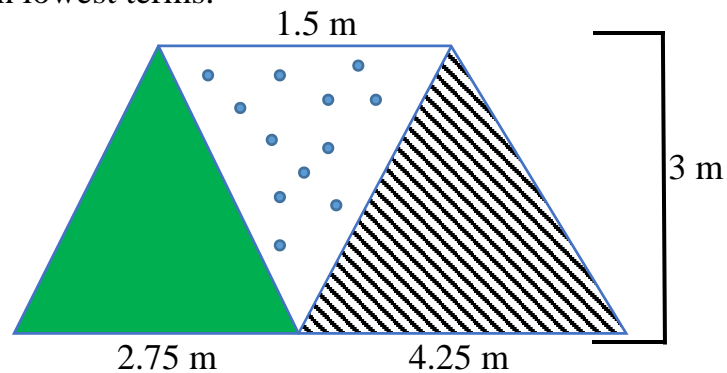
17.

A rectangle with a total width of 6.25 in (1.5 in + 3 in + 1.75 in) and a height of 4 in. The rectangle is divided into three vertical sections. The leftmost section, with a width of 1.5 in, is filled with diagonal hatching. The middle section, with a width of 3 in, is filled with blue polka dots. The rightmost section, with a width of 1.75 in, is filled with yellow.

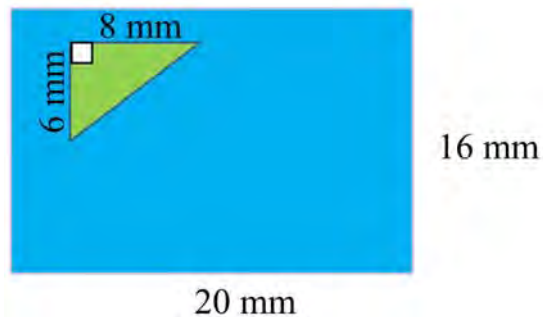
Find the probability of using a randomly chosen method of landing on the polka dot section. Give your answer as a percent.

Complete the following questions.

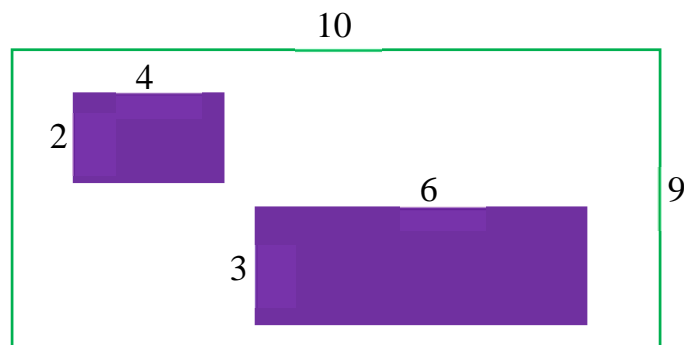
18. What is the probability of landing on the striped triangle section? Give your answer as a fraction in lowest terms.



19. Calculate the probability of landing inside the rectangle without touching the triangle. Give your answer as a decimal rounded to the nearest thousandths.



20. Find the probability of landing in a purple area. Give your answer as a repeating decimal.



Complete the following problems.

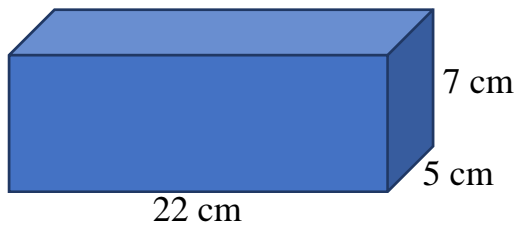
1. Thirty-one out of 227 students made the superintendent's honor roll. Twenty were girls and eleven were boys.

A What is the ratio of boys to girls with honors?

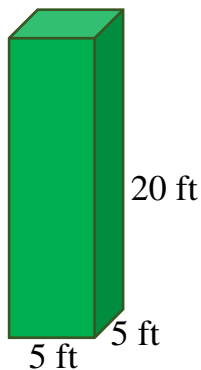
B _____
What is the ratio of the total number of students to the number of girls with honors?

Find the surface area of the following prisms. $SA = 2(wl + hl + hw)$.

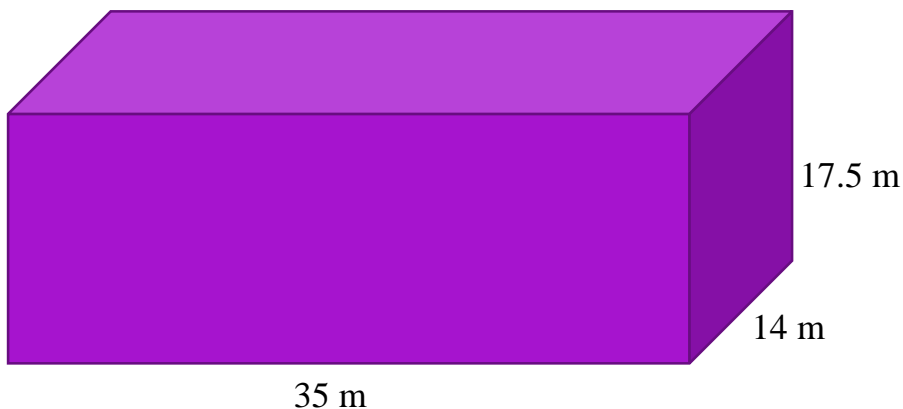
2. _____



3. _____



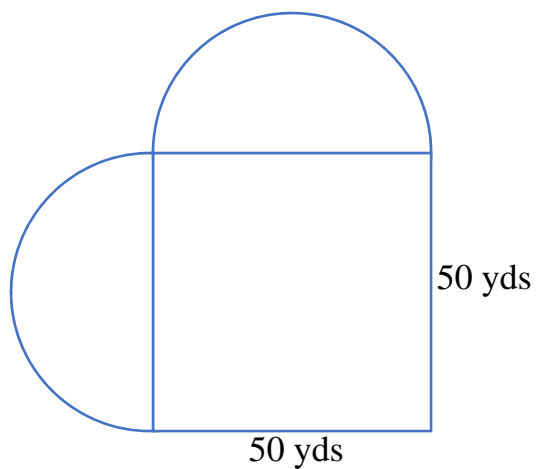
4. _____



Find the area and perimeter of the following composite figures.

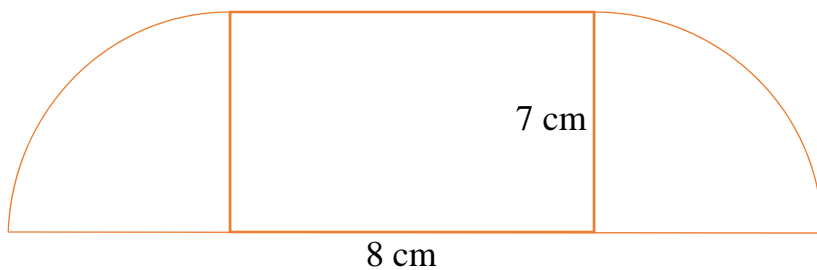
5. Area = _____

6. Perimeter = _____



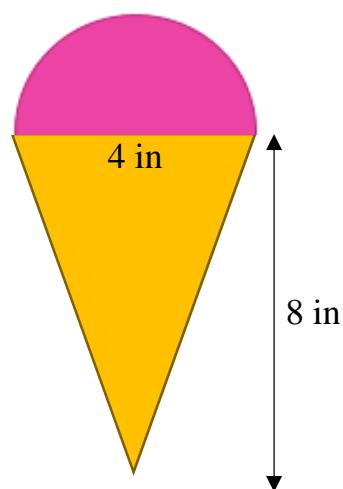
7. Area = _____

8. Perimeter = _____



9. Area = _____

10. Perimeter = _____



7.D.2.3 Use proportional reasoning to draw conclusions about and predict relative frequencies of outcomes based on probabilities.**Real-World Connections**

Whether you know it or not, every day, all day, you are constantly predicting what will happen. You pick out the clothes you will wear based on what you think the weather will be. You choose where to sit in the cafeteria based on where you think your friends will sit. You choose and choose and choose, and every choice is a prediction of how likely you think an event or series of events is likely to happen. How likely it is for something to happen is called probability. Proportional reasoning is about being able to make comparisons between objects or quantities in a multiplicative rather than additive way. The comparison is described using terms such as: double, half, three-times greater rather than simply describing something as smaller than, or bigger than. It is essential to problem solve in the areas of data and chance.

Vocabulary

conclusion	the end or finish of an event or process
predict	Say or estimate that a specified thing will happen in the future or will be a consequence of another action.
frequency	the number of times an event or item appears in a set of data; how often something happens, often written as a rate e.g., heartbeats per minute
outcome	the result of a single trial of a probability experiment

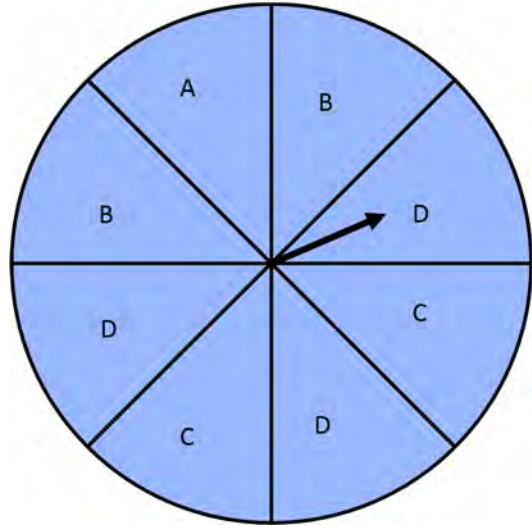
Apply proportional reasoning to draw conclusions about and predict relative frequencies of the following outcomes based on probabilities.

1. If you roll a 6-sided die 12 times, what is the best prediction possible for the number of times you will roll a six?

Apply proportional reasoning to draw conclusions about and predict relative frequencies of the following outcomes based on probabilities.

2. What is the chance of the spinner below landing on the letter B?

3. What if you spin it sixteen times?



4. About 10 percent of the items produced at the XYZ Company are damaged. Out of 2,500 items, how many would you predict will be damaged?

5. There are 10 tiles in a box. The letter A is on 4 of them. The letter B is on 6 of them. What is the possibility of randomly choosing the letter A out of 10 trials, if you return the chosen letter to the box on each trial?

6. If you flip a coin 12 times, what is the best prediction possible for the number of times it will land on heads?

Apply proportional reasoning to draw conclusions about and predict relative frequencies of the following outcomes based on probabilities.

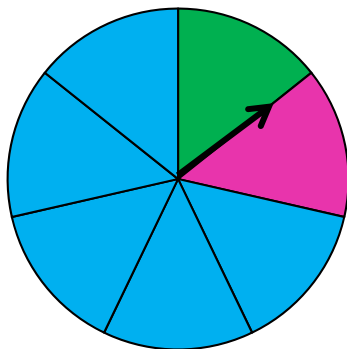
7. Ross surveyed his classmates about their favorite ice cream flavor.

Chocolate	12
Strawberry	2
Cookie Dough	7
Bubble Gum	1

If Ross surveys 12 more students, how many of them should he expect to pick chocolate, based on past data?

8. If you flip two coins four times, what is the best prediction possible for the number of times both coins will land on tails?

9. If you spin 7 times, what is the best prediction possible for the number of times it will land on blue?

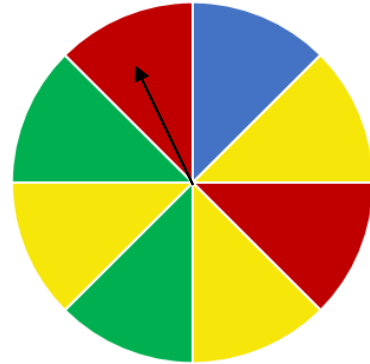


10. Of the pizzas sold recently at Pizza Palace, six had pepperoni and three did not. Considering this data, how many of the next 15 pizzas sold would you expect to **not** have pepperoni?

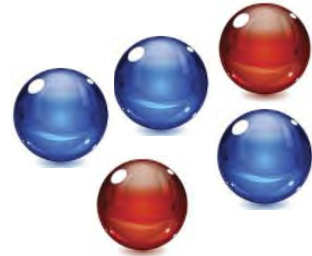
7. D.2.3 Use proportional reasoning to draw conclusions about and predict relative frequencies of outcomes based on probabilities.

Apply proportional reasoning to draw conclusions about and predict relative frequencies of the following outcomes based on probabilities.

1. If you spin the spinner 8 times, what is the best prediction possible for the number of times it will land on red or yellow?



2. You select one of these five marbles out of a bag without looking and then put it back. If you do this 10 times, what is the best prediction possible for the number of times you will pick a red marble?



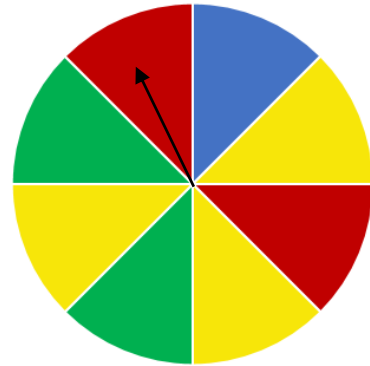
3. Middle school students participated in a survey about their favorite sport. Of the students surveyed, two said soccer was their favorite sport, while four of the students had other favorite sports. If a dozen more students are surveyed, how many of them are expected to pick soccer, based on past data?

Apply proportional reasoning to draw conclusions about and predict relative frequencies of the following outcomes based on probabilities.

4. A Country Mart employee counted how many cartons of each flavor of ice-cream were sold yesterday. Based on past data, how many of the next 12 cartons of ice-cream sold should you expect to be strawberry?

Cartons Sold Yesterday	
Strawberry	5
Vanilla	6
Chocolate	2
Orange Sherbet	2

5. If you spin the spinner 16 times, what is the best prediction possible for the number of times it will **not** land on red?



Use the following scenario to answer questions 6-8.

David surveyed fifty of his classmates about whether they are planning to work over the summer. Of the students surveyed, ten said they plan to work.

6. Based on this data, what is the probability the next person surveyed will say yes to working over the summer?

7. Based on this data, what is the probability the next person surveyed will say no to working over the summer?

8. If a hundred more students are surveyed, how many of them would be expected to work this summer, based on this past data?

Answer the following questions.

9. You select a marble without looking and put it back. If you do it 10 times, what is the best prediction possible for the number of times you will pick a blue marble?



Apply proportional reasoning to draw conclusions about and predict relative frequencies of the following outcomes based on probabilities.

10. If you make a selection 20 times, what is the best prediction possible for how many times you will pick a purple marble?

11. If you roll a 6-sided die 12 times, what is the best prediction possible for the number of times you will roll a 5?

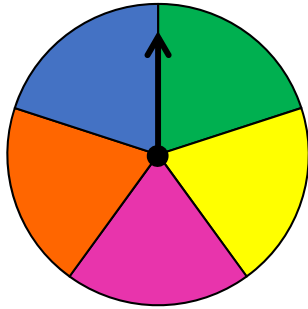
12. Clementine surveyed her classmates about their favorite holiday.

Thanksgiving	12
Christmas	15
Fourth of July	3
Easter	5

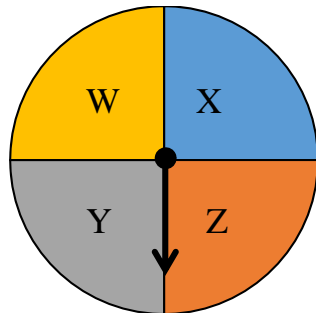
If Clementine surveys 70 additional students in her middle school, how many of them should she expect to choose Christmas based on past data?

Apply proportional reasoning to draw conclusions about and predict relative frequencies of the following outcomes based on probabilities.

13. If you spin the spinner 10 times, what is the best prediction possible for the number of times it will **not** land on yellow?



14. If this spinner is spun 160 times, predict the number of times it would be expected to land on section Z.



- A exactly 40 times
- B about 20 times
- C about 16 times
- D about 40 times

15. If a regular six-sided die is rolled 180 times, predict the number of times it would land on an even number other than 6.

Apply proportional reasoning to draw conclusions about and predict relative frequencies of the following outcomes based on probabilities.

16. Sully has a spinner split into eight equal-sized sections numbered 1 through 8. He spun 928 times. Which of the following would be the best estimate of the number of times it landed on number 2?
- A 187
 - B 95
 - C 247
 - D 116
17. For every 54 texts Michael sends from his cell phone, 33 texts are sent to his friend Aaron. If Michael sent 810 texts from his cell phone last month, what is a reasonable prediction of the number he sent to Aaron last month?
- A 50
 - B 330
 - C 500
 - D 540
18. Holly bought three dozen donuts to take to her math class for “Pi” day. There were 15 cake donuts, 9 glazed donuts, 8 chocolate donuts, and 4 blueberry donuts. If she randomly gave donuts to 24 of her classmates, which of the following is the best prediction of the number of students that received a chocolate donut?
- A 2
 - B 5
 - C 3
 - D 7

Apply proportional reasoning to draw conclusions about and predict relative frequencies of the following outcomes based on probabilities.

19. Scott drew a card from a standard deck of 52 cards. Each time he drew a card, he recorded which card he drew and returned it to the deck. He drew an ace 156 times. Of the times he drew an ace, which of the following would be a good estimate for the number of times the ace drawn was the ace of spades?
- A 39
 - B 78
 - C 14
 - D 30
20. Last summer 15 trombone players attended a jazz camp with 105 other musicians. Based on last summer's data, how many of the next 216 musicians to sign up for the jazz camp this summer would you expect to be trombone players?
- _____

Evaluate.

1. $|3 - 8| = \underline{\hspace{2cm}}$

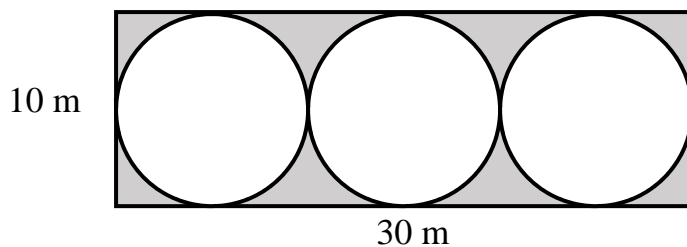
3. $-|2 - 7| = \underline{\hspace{2cm}}$

2. $|6| \cdot |-2| = \underline{\hspace{2cm}}$

4. $|-8| \div |-2| = \underline{\hspace{2cm}}$

Find the probability that a randomly chosen point in the figure lies in the shaded region. Give the solution as a fraction, decimal, and percent.

5.



Simplify the following expressions.

6. $6^2 + (-3^3) = \underline{\hspace{2cm}}$

7. $2^2 - 2^0 = \underline{\hspace{2cm}}$

8. $10^3 + 9^1 = \underline{\hspace{2cm}}$

Solve and Graph.

9. $5x < -10$

10. $3x + 2 \geq 8$

A

absolute value: the absolute value of a real number is its (non-negative) distance from 0 on a number line

addition: to join two or more numbers or quantities to get one number called sum or total

algebraic expression: a mathematical phrase combining numbers and/or variable.

- an expression does not contain equality or inequality signs but may include other operators and grouping symbols
- both sides of an equation are expressions

area: a measure of the amount of space within a closed two-dimensional shape

area of a circle: the area of the interior of the circle, which can be found with $A = \Pi r^2$ where r is the radius and Π the irrational number “pi”

area of a trapezoid: the sum of its bases multiplied by the height of the trapezoid then divided by 2; the area is measured in square units

area of similar triangles: if two similar triangles have sides in the ratio $x:y$, then their areas are in the ratio $x^2:y^2$

associative property: of addition $(a + b) + c = a + (b + c)$
of multiplication $(a \times b) \times c = a \times (b \times c)$.

B

bar notation: a horizontal bar over decimals to indicate that they repeat

C

calculate: to work something out, a mathematical operation

central tendency: central tendency refers to the measures of a data set. Measures of central tendency include mean, median, and mode

circle: the set of all points that are equidistant from a given point, called the center of the circle; the set of all points that lie inside the circle is called the interior of the circle

circumference of a circle: the length of the circle if cut and opened up to make a straight line segment, which can be found with $C = \Pi r$ where r is the radius and Π is the irrational number “pi” (approximately 3.14 or $\frac{22}{7}$)

cm²: a cm raised to the second power which is indicated by a small 2 to its upper right

cm³: a cm raised to the third power which is indicated by a small 3 to its upper-right

collect: bring or gather together

commutative property: in addition and multiplication, numbers may be added or multiplied together in any order

compare: tells how two or more things are alike

composite figure: a shape composed of a combination of other shapes; composite figures are often split into their component shapes to calculate area

conclusion: the end or finish of an event or process

coordinates: coordinates are written as ordered pairs of numbers or letters and numbers

coordinate plane: a plane in which a point is represented using two coordinates that determine the precise location of the point

D

data: a collection of information

decimals: a number in a number system based on 10, also known as the Base -10 system or Hindu-Arabic system which uses 10 digits to show all numbers... 0, 1, 2, 3, 4, 5, 6, 7, 8, 9

diameter of a circle: a straight-line segment passing through the center of the circle and terminating on the circle

dilations: a transformation moves each point along the ray through the point emanating from a fixed center, and multiplies distances from the center by a common scale factor

discounts: a reduction in normal price

distance: the length between two points (or objects)

distance-time: extent or amount of space between two things, points, lines, etc.; intervals

distributive property: multiplying a number is the same as multiplying its addends by the number, then adding the products

division: sharing or grouping a number to equal parts

E

equal to (=): a sign indicating two numbers are the same ($7 = 7$)

equations: a number sentence that uses the equal sign ($1 + 2 = 3$).

equivalent: expressions that simplify to an equal value

equivalent fractions: fractions with the same value

equivalent numerical expressions: two numerical expressions are said to be equivalent if one can be obtained from the other using the properties of operations, such as the commutative, associative, and distributive properties, as well as by representing numbers in the expressions in different but equivalent forms

estimate: to make an approximate calculation, often based on rounding, $2.3 \approx 2$

experiments: a scientific procedure to make a discovery, test a hypothesis, or demonstrate a known fact

exponent: the number that indicates how many times the base is used as a factor, e.g., in $4^3 = 4 \times 4 \times 4 = 64$, the exponent 3, indicating that 4 is repeated as a factor three times

F

figure: a visible shape or form; outline

fraction: a number that expresses parts of a whole or set

frequency: the number of times an event or item appears in a set of data; how often something happens, often written as a rate e.g. heartbeats per minute

G

gaps: unfilled spaces

geometric figures for similarity: when two figures are similar, the ratios of the lengths of their corresponding sides are equal

graph: a visual diagram used to represent statistical information or functions and equations

graphing technology: to represent by means of a graph using machinery and equipment developed from the application of scientific knowledge

greater than: is more than, symbol $>$

grouping symbols: dividing things into equal groups or sets with symbols and signs that are commonly used to represent values, equality, operations, grouping and mathematical terms

H

histogram: a type of bar graph used to display the distribution of measurement data across a continuous range

I

inequality: inequality occurs when things are not equal; four types of inequalities:

- $a \leq b$... a is less than or equal to b
- $a \geq b$... a is greater than or equal to b
- $a < b$... a is less than b
- $a > b$... a is greater than b

integers: the set of numbers that contains the whole numbers and their additive inverse (opposites); no fractions or decimals

interpret data: provide meaning to facts

inverse relationships: operations that undo each other (e.g., addition and subtraction are inverse operation; multiplication and division are inverse operations)

inversely proportional relationships: when one value decreases at the same rate that the other increases or the value increases at the same rate as the other decreases

L

length: distance from one end to the other

less than: relationship of one number being smaller than another number, symbol $<$

line: a line is a straight one-dimensional figure of infinite length

linear equation: any equation that can be written in the form $Ax + By + C = 0$ where A and B cannot be; the graph of such an equation is a line

linear inequality: like a linear equation such as $y = 3x + 2$ but it will have an inequality symbol $<$, $>$, \leq , or \geq instead of an $=$

M

mean: a measure of central tendency in a set of numerical data; computed by adding the values in a list and then dividing by the number of values in the list

measure: use of standard units to determine size or quantity: length, breadth, height, area, mass, weight, volume, capacity, temperature and time

median: a measure of central tendency in a set of numerical data; the median of a list of values is the value appearing at the middle of a sorted version of the list; or the mean of the two central values, if the list contains an even number of values

mode: a measurement of central tendency in a set of numerical data; in a set of scores, values or numbers the mode is the one that occurs the most times

multiplication: a mathematical operation where a number is added to itself

multi-step problem: one or more problems must be solved to get the information needed to solve the question being asked

N

natural or counting number: 1, 2, 3, 4, 5... no zero

non-negative rational number: can be expressed as the quotient of two integers, a numerator and a non-zero denominator

non-repeating decimal: a decimal that neither terminates nor repeats

non-terminating decimal: a decimal that does not end in an infinite sequence of zeros; also known as an infinite decimal

number line: a line in which numbers are marked at intervals

O

order: an arrangement of a set group of objects

order of operations: a rule for evaluating expressions : **PEMDAS**

1. perform the operations in parenthesis (**p**arenthesis)
2. compute powers and roots (**e**xponents)
3. perform all multiplication and division from left to right (**m**ultiplication/**d**ivision)
4. perform all addition and subtraction from left to right (**a**ddition/**s**ubtraction)

origin: the point of intersection of the x and y -axis on a coordinate or Cartesian plane; the coordinate of the origin is (0, 0)

outcome: the result of a single trial of a probability experiment

overlaps: extend over to cover partially

P

percent decrease: a measure of change; the extent to which something loses value

percent increase: a measure of change; the extent to which something gains value

perimeter: the total length of all the edges of a polygon.; often, perimeter is thought of the distance around an object, traversed once along the edges starting from one vertex and ending at the same vertex

pi (π): the irrational number that is the ratio of the circumference to the diameter of a circle; for computational purposes, 3.14 or $\frac{22}{7}$ is frequently used as an approximation of π .

pie chart: a graph using a divided circle where each section represents a percentage of the total; may also be called a circle or sector graph

positive integer exponents: integers are the set of numbers that contain the whole numbers and their additive inverse (opposites); no fractions or decimals; positive integers are the counting or natural numbers in the set; as an exponent, this number indicates how many times the base is used as a factor

predict: estimate that a specified thing will happen in the future or will be a consequence of another action

probability: the chance that a specific outcome will occur, measured as a ratio of the total of possible outcomes

- experimental probability- when trials of probability experiment are run and data is collected, the experimental probability of desired outcome is the relative frequency of that outcome as a ratio of the number such outcome to the total number of outcomes
- theoretical probability- the number of ways that the event can occur, divided by the total number of outcomes. It is finding the probability of events that come from a sample space of known equally likely outcomes

properties of operations: the rules in relation to operations on numbers

properties of similarity: descriptors of polygons with the same shape but not necessarily the same size; the corresponding angles have equal measures and the length of corresponding sides are proportional

proportional reasoning: the relationship between the two things are understood as a multiplicative relationship

proportional relationship: an equation that states that two ratios are equivalent

Q

quantity: amount, number of, total, sum, size or extent; indicates how much or how many

R

range: the difference between the maximum and minimum values of a data set, a measure of the spread of the data

ratio: a relationship between quantities such that for every a unit of one quantity there are b units for the other; a ratio is often denoted by $a:b$ and read “ a to b ”.

rational number: a number expressed as a fraction p/q where p and q are integers, and $q \neq 0$

rational-valued length: distance from one end to the other using rational number values, a number expressible in the form $\frac{a}{b}$ or $-\frac{a}{b}$ for some fraction $\frac{a}{b}$; the rational numbers include integers


real-world mathematical problem: a math problem that teach standards through topics that students will likely experience in their world

rectangular prism: a three-dimensional object constructed from three pairs of parallel rectangles (called faces) that share common edges to form an enclosed space such that opposite rectangles are congruent; the vertices of the rectangles are the vertices of the prism, and the sides of the rectangles are called edges; a cube is a rectangular prism in which each face is a square of the same size

reflection: a type of transformation that flips points about a line, called the line of reflection; taken together, the image and the pre-image have the line of reflection as a line of symmetry

repeating decimal: a repeating decimal, also called a recurring decimal, is a number whose decimal becomes the same sequence of digits and repeats indefinitely; the repeating portion of a decimal expansion is denoted with a vinculum, for example, $\frac{1}{3} = 0.3333333 \dots = 0.\overline{3}$.

S

same sized unit cubes: same unit, a determinate quantity as a standard of measurement of a cube, the regular solid of six equal square sides; ex.  1 unit cube

sample space: in a probability model for a random process, a list of the individual outcomes that are to be considered

scale: the ratio of the measurement of the drawing compared to the measurement of the original subject

scale factors: for similar shapes, the common ratio of corresponding side lengths is called the scale factor; informally, it is the multiplicative amount by which the lengths of one shape are enlarged or shrunk to obtain a shape to which it is similar

side: the lateral face of a three-dimensional solid; also, the line joining the vertices of a polygon

similar figures: figures that have the same shape are said to be similar, the ratios of the lengths of their corresponding sides are equal

slope: a measure of the steepness of a line in a Cartesian plane, found by determines the constant change in the y-coordinate per 1 unit change in the x-coordinate

solution: the answer to a problem

spreadsheet: a spreadsheet is a computer program which is used to organize and manipulate data; a spreadsheet displays a table where the data is entered into cells arranged in columns and row; each cell has a column letter and a row number, e.g. B4,D6; spreadsheets are also like a calculator because formulas can be applied to the cells to make calculation; calculations in one section can be linked to other sections so all the data in the spreadsheet updates as new entries are made; most spreadsheet programs also have a graphing or charting function so data can be displayed visually

spread: in statistics, spread describes the variability of data set; measures of spread include the range; quartiles, deciles, percentiles; the five-number summary; standard deviation and variance

square unit: the area of a *square* each of whose sides measures 1 unit; it is used to measure area

standard algorithms: are the specific method usually used for solving math problems

subtraction: to reduce one quantity from another; $(x-y)$

surface area: the total measure of the area of the faces of a rectangular prism; equivalently, the total area of a net for the prism

symbols: symbols and signs are commonly used to represent values, operations, grouping and mathematical terms

T

terminating decimal: a decimal that end.

tips: a gift or a sum of money tendered for a service performed or anticipated; gratuity

transformation: a prescription, or rule, that sets up a one-to-one correspondence between the points in a geometric object and the points in another geometric object; reflections, rotations, translations, and dilations are examples of transformations

translation: a type of transformation that moves every point on a graph or geometric figure by the same distance in the same direction without a change in orientation or size

trapezoid: a quadrilateral only having two sides that are parallel

U

unit pricing: a unit price compares the price of something to a unit of measurement, for example, cost per kilogram or cost liter or gallon

unit rate: a comparison of two measurements in which one of the terms has value of one

V

variable: a quantity that can change or that may take on different value

vertices: a point where:

- two or more rays or the sides of an angle meet, \square the adjacent sides of a polygon meet, or
- the edges of a solid figure meet.

volume: a measurement of the amount of space within a closed three-dimensional shape; Ex: $V = lwh$

W

whole number exponents: the numbers 0, 1, 2, 3...that indicate how many times the base is used as a factor, e.g., in $4^3 = 4 \times 4 \times 4 = 64$, the exponent 3, indicating that 4 is repeated as a factor three times

whole number: zero and counting numbers; the numbers -3, -2, -1, 0, 1, 2, 3, ...

Z

zero: the numeral 0, used as a place holder (nothing, none, nil, naught)

